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GAS JOURNAL

LIGHT ♦ HEAT ♦ POWER ♦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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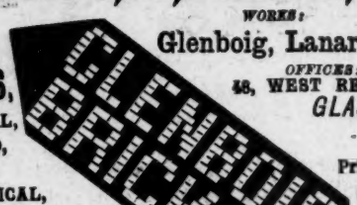

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXVIII., No. 2814.] TUESDAY, APRIL 17, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Coal Contract Position.

PRIOR to the announcement which we made last week regarding the permission of the Coal Controller to gas undertakings to enter into twelvemonth contracts for their supplies of coal, subject to his right to cancel a contract if necessary, the reports from the coalfields indicated that, while there had been numerous inquiries, the general policy of gas undertakings had been to defer entering into definite commitments until the doubt raised by the circulation of the order as to three-month contracts had been cleared-up. This has now been done; and the road is free for making new contracts—at the same time ensuring that neither buyer nor seller breaks the law by entering into contracts at figures in excess of the terms of the Price of Coal (Limitation) Act. Any infraction of the Act, if brought to the notice of the Controller, will have consequences which will be the reverse of pleasant to the parties concerned. This is clear from what was stated in the final paragraph of the editorial on "Twelvemonth "Gas Coal Contracts" in the "JOURNAL" last week. In the meantime, several undertakings are also delaying entering into new contracts owing to belated deliveries under the existing ones; and pressure is being applied to induce the collieries to speed-up the arrears. It is possible that experience in connection with bad deliveries may induce a considerable transfer of custom; but there must be a care to ascertain whether the fault lies at the doors of the collieries or at those of the railways. The multifold troubles with shipments are too well demonstrated to leave any doubt as to where the blame for backward delivery lies in connection with seaborne coal, the freights for which from the Tyne to London have, in some instances, now reached as high as 21s. 6d. per ton. As to railway transit, it is stated that the supply of wagons has improved somewhat; but *per contra* the Easter Holidays have interfered with both supplies and deliveries.

Now, however, that the long spell of wintry weather has, we hope, about ended, every effort must be made to accumulate stocks in preparation for next winter, which, if the war continues, will have all the bad points of the last one accentuated in respect of coal supplies. Nothing must be left to chance. Into account, too, must be taken the facts that the coal industry is being subjected to a "combing-" out" the same as other industries, and that it is anticipated that shipments to France and Italy will be greater this year than last. As an off-set, it is gratifying to note that there was last year a larger quantity of coal available for home consumption and the Admiralty than even in the pre-war year of 1913. Of course, there are no published figures to show the Admiralty requirements. But still the position last year, by comparison, was by no means unsatisfactory. The total coal output of the United Kingdom, as estimated by the Board of Trade, was 255,846,000 tons, or an increase of 2,667,000 tons contrasted with 1915. Deducting exports and bunkers from the output, last year the quantity of coal available for home consumption and the Admiralty was 200,845,000 tons; in 1915, 193,226,000 tons; in 1914, 184,649,000 tons; in 1913, 189,073,000 tons. From these figures is seen the progressive rise in the available quantity; but, on the other hand, there has been a progressive decline in exports and bunkers. However, the immediate duty of gas undertakings is to make arrangements for a large storage of coal during the summer. By doing so—providing they can get the coal—they will be protecting themselves for next winter, at the same time relieving the Coal Controller, the railways, ships, and collieries at what will be, should the war continue over the winter, an anxious and arduous period. To help to ward-off trouble, it will be well to note that the Coal Controller has appointed, or is appointing, Resident District Representatives, who will be in close touch with the work of the collieries in their respective areas. In the general interest, it would save the Coal Controller's Department much correspondence if the names and addresses of these representatives were published, with an indication as to the matters upon which reference may be made direct to them.

The Plant and the Standard.

IT was on Aug. 8 last year that we published the instructions that were to be pursued by applicants for a change of standard, under the Gas (Standard of Calorific Power) Act, from illuminating power to calorific value. In the eight months and more that have elapsed, applications for the change have been made at sluggish pace. To date, those announced by the departments concerned only total to 100, of which 73 have been made by gas companies and 27 by gas-supplying local authorities. This difference is interesting, and its largeness inexplicable, as surely up North the local authorities who are washing by oil are fairly numerous and important from the point of view of gas-works capacity. But in this connection, authoritative approximate figures published in an editorial in the "JOURNAL" for Feb. 13 may be recalled. It was then stated that oil-washing was proceeding at only 80 gas-works; but the additional plants that were being erected or were on order would bring the total up to 150. This is a comparatively small number; and it was then hoped by us that many more of the 700 or 800 works that had tar-washing plant in existence would before long announce their intention of adopting the more efficient oil-washing process, and that the balance of the works that were not doing anything would add their measure of benzol, toluol, phenol, &c., to the pool from which are being drawn the substances that are doing a large part in trouncing our enemies—a sample of which they had at Easter time in the great victory by the British Army.

Assuming that all the applications for the calorific standard are by gas undertakings that are oil-washing their gas, or have taken steps to do so, this shows that only about two-thirds the number that had up to Feb. 13 started oil-washing have applied for a change of standard under the Act. We had hoped to have seen a much larger number long before this, and think that an excellent opportunity is being lost. It is not forgotten that some important undertakings were working under a calorific standard before the war; but this does not account for the difference to which we refer. It must be remembered that the relief the Ministry of Munitions has given gas undertakings from forfeiture or penal consequences owing to any failure on their part to maintain the illuminating power or calorific value standard during the time they are working to meet the requirements of the Ministry will, of course, not continue when present abnormal needs in respect of explosives cease to exist. Then those gas undertakings that are working under statutory standards will again be expected to comply with them; and we have no doubt, in the case of companies, the local authorities will see that they do. Those who in the good time coming are still under the illuminating power standard will, if they desire to continue the use of their oil-washing plant, be in a quandary. It is now abundantly clear that the oil-washing of gas for the extraction of crude benzol is

a process that has come to stay; and it will in time, in our opinion, become as ordinary as any of the old-established processes appertaining to gas and residuals production. But works that are tied to the illuminating power standard will be at a disadvantage in pursuing this new business, compared with those that have transferred their obligations to the calorific value standard. To persist in the extraction of benzol with an illuminating power standard with which to comply, would mean the use of a high candle-power carburetted water gas for the purpose of enrichment. Or partial compensation might be obtained by reducing the quantity of gas produced per ton of coal carbonized, or by completely debenzolizing part only of the gas, and using it as a diluent of the other part. But in any event it would simply mean that any profit that could be made out of the benzol would be neutralized by the steps taken to restore the gas to a condition that would make it comply with the illuminating power standard.

It therefore comes to this, that after the war the oil-washing plant will be of no profitable service where the illuminating power standard remains; and those who are oil-washing or proposing to do so, and who do not wish the new plant to be rendered valueless in peace time, but to then contribute to the requirements of important industries of the country, should see to it that they do not further neglect the simple process that is now available for bringing about the conversion of the standard of quality under which they operate.

Wanted, a Special Committee.

The more one considers, in the light of the disclosures of the world-embroiling war, the future security and economic conditions of our country, the more impressed one becomes with the great possibilities there are in a thorough industrial reorganization. It is seen that national security and industrial economy and prosperity are indivisibly interlinked. Conviction is promoted that many of the old cherished theories and practices upon the soundness of which we have hitherto plumed ourselves will have to be crushed, and new ones must take their place. It becomes perfectly transparent that maximum economy will not be realized without the breaking-down of the sequestrating industrial boundaries which have been constructed on the false assumption of a clearly-defined independence. In one direction, this was a point in the suggestive article Mr. E. W. L. Nicol contributed to our columns last week, under the title of "Fuel "and Power Supply." Fuel and power supply are allied. Power cannot be obtained without fuel; and the most economical provision and use of the former mean the economy of the latter. There is not an industry that does not rely, directly or indirectly, upon the economy of fuel and power; and, as Mr. Nicol in effect points out, the greater the economy in both, the greater the influence on the manufacturers' producing cost, which is the factor vital above all others in the coming competitive industrial struggle. The industries in this matter cannot therefore remain apart, if the highest interests of the country are to be served. Fuel supplying industries cannot continue as purely independent entities; and fuel-using industries cannot be without interest in the elevation of a general economy through the practices of the industries from which their fuel and power supplies are drawn. From the coal industry to the extremes of manufacture, the proper use of fuel means for all a cumulative prosperity; and as the war has asserted, the correct use of coal, as in the gas industry, is essential not only to the industries requiring power, heat, dyes, fuel oils, acids, and much else, but to ensure the permanence and progressive development of the "defensive position of the Empire."

We have recently, in certain editorial articles, been considering questions affecting the economy of coal in the gas industry, and the provision of a greater volume of heat units for industrial and domestic purposes at a lower price than could ordinarily obtain. The articles referred to appeared on March 20 and April 3 and 10, and treated upon the "Relation of Calorific Power to Gas and Fuel Economy," "Manufacturing Economy and Coke Gasification," and "Interlinking in the Gas Industry." Arising from these articles, there has also been correspondence on the subject of "The Adulteration or Dilution of Gas." Mr. Nicol goes further; and the "ideal scheme" he presents with the view to raising the economy of fuel use and power production is quite of practicable form, as the ravages of time supply opportunities for a transference from the old to a new order. For the promotion of fuel and power economy, he suggests a scheme of State control and co-ordinated direction, in which gas and electric power production would be allied, with the view to realizing a variety of economies from the coal itself to the heating of boilers for the production of steam for electrical generation. The thermal efficiency of the coal-carbonizing system as practised in gas-works, together with the number and value of the products, are of national importance, because unequalled in any other process of utilizing coal. To first treat in gas-retorts the coal used in electrical generation would at once bring into combination the economy and efficiency of the gas process and the operation of electrical generation. One of the gas-coal carbonizing economies is the charging of the producers with incandescent coke direct from the retorts; and Mr. Nicol finds in this a suggestion for raising boiler efficiency by having the boilers contiguous to the retort-settings, and similarly feeding them with incandescent coke—thus conserving the sensible heat in the coke, which would otherwise be wasted in quenching, saving the heat which would otherwise be expended in re-heating and in evaporating the surplus moisture in the fuel, economizing transport, and securing other benefits. There is a prospect of further economy by utilizing for steam-raising, as is a nascent practice in America, the waste heat from the retort-settings. There is nothing impracticable about the scheme outlined by Mr. Nicol. Given acceptance, the change would necessarily be slow; and great opposition to anything of the kind coming about might be expected from the men of the electrical industry who would feel their independence sadly impaired and imperilled by being harnessed in this way to the gas industry. Unless Parliament insists upon the fuel resources of the country coming under control, and upon their proper expenditure and use so as to realize the maximum value from them, we are afraid that Mr. Nicol's suggestion will always remain one of those sensible ideals the realization of which is impeded by human vanity and jealousy.

This brings us to the salient point. A Board of Fuel Research has been formed; and the recommendations of the Board will have great weight and will be far-reaching. The Board will require information from all possible directions; and reports and evidence placed before them in well-digested and presentable style will naturally receive close attention. What is the gas industry doing in this matter? Has it information as to the economies of its processes, their direct and collateral advantages, and their potentialities all accumulated, digested, and in presentable form? Has it the particulars ready to show how it can promote fuel economy almost immediately, through its own operations, by making good coal gas and diluting with straight water gas? Is it prepared to show that fuel economy and the serving of the interests of the country through benzol extraction and the supply of B.Th.U. at a cheap rate, are incompatible with stiff parliamentary regulation? Has it the information available to explode the theories of those faddists who believe in the fastening of the industry to the low-temperature process of carbonization? Has it the particulars ready to show the truth of the final pregnant words in Mr. Nicol's article, that "to retain in gas coke, in any "degree, the dual characteristics which are the condem-"nation of bituminous coal as fuel, would be to sacrifice "efficiency without the attainment of any corresponding "gain"? Has it prepared any suggestions marking the ways of possible developments? If not, why not? The gas industry cannot go before the Board of Fuel Research with, from a number of mouths, ragged detail and a medley of suggestions. The members of that body must have placed before them something authentic and well moulded; something that will represent the at any rate almost unanimous voice of the industry. To do this, there should be appointed a Special Committee, constituted of gas experts, to look into these and cognate questions, and to prepare a report for presentation to the Board. Otherwise we fear the gas industry will not obtain the full advantage it should do from the work of the Board. There is, of course, the difficulty just now of getting together a Committee of competent men for such a purpose; but let it not be forgotten that the electrical industry has Committees at work upon schemes of economy and trade development. Let it not be overlooked, too, that anything that can be done now in this way in the interests of the gas industry must, if it has effect at all, influence not only the present, but that large future for the industry to which all gas men are looking with confidence.

The Original Coalite Patent.

It appears that our remarks on the Coalite Company's affairs in the "Journal" for April 3 (p. 14) have travelled into certain interested quarters, where we have no doubt what we described as the "rich optimism" and "boastfulness" of the Chairman in recently addressing the shareholders have also been duly weighed. In our remarks, we referred to the existence of other low-temperature systems, the presence of which on the face of the earth the Coalite Company are evidently not prepared to contest. This very presence, we pointed out, ought to convince the Coalite shareholders that they have no monopoly of the principle of low-temperature carbonization, quite apart from the fact that it was with low-temperature carbonization the gas industry commenced operations over a century ogo. The Chairman referred to dealing with foreign patents as soon as the Barnsley plant is in operation; and this appears to be a particular point of interest. We observed that he did not specify the patents to which he was alluding. The Company may have patents for details of plant, but certainly, we repeat, no monopoly of low-temperature carbonization. It is interesting to recall the fact that Thomas Parker's original ("Coalite") patent is dated June 22, 1906; and those who may be concerning themselves with the purchase of Coalite patents will no doubt calculate out that in June the patent has already had a life of eleven years. It will also interest them to know that in our issue for May 10, 1910 (p. 362), it was stated that the Coalite Company had been unsuccessful in defending what they were pleased to regard as their master-patent by opposing the application of a Glasgow Syndicate for a patent for producing a smokeless fuel. In the succeeding issue, we published a queer little letter from Messrs. Edward Evans & Co., on behalf of the Coalite Company, in which they asked us to do something which we have never yet seen fit to do. That incident ended with a letter (published on June 21, 1910) from Messrs. Edmund Hunt & Co., the Patent Agents for the Glasgow Syndicate, in which they confirmed the statement we made as being "substantially correct." They remarked that the Coalite claim "to a monopoly (in this class of smokeless fuel) has been effectively knocked on the head." We wonder whether this in any way affects the value of the patents with the negotiations for the sale of which the Directors of the Coalite Company are hopeful of some day being very busy.

The Railway Settlement.

The railway men and women have secured another advance in their war bonus. It may be remembered that, when last the war bonus of the railway employees was advanced to 10s. per week, without consideration being paid to the widely differing rates of pay existing in the different grades of railway employment, the advance was unfairly made the standard for further claims in other quarters, in some of which the men are exceptionally well paid and excellently treated. On the other hand, the pre-war rates of pay of a large percentage of railway men—such as porters—were exceedingly poor. But these facts were not taken into account by those in other industries who preferred a claim to be placed on the same footing as railway employees in respect of war bonus without having the relative pre-war rates of pay taken into consideration. There is one industry that has not a Government backing, and that could not, in the case of the majority of its undertakings, possibly stand a further advance of war bonus while the present conditions exist. However, the railwaymen asked for an addition of 10s. per week to the bonus, which would have meant doubling it. But in the result an agreement has been reached by which men over eighteen years of age get an advance of 5s. per week, and women 2s. 6d.; men under eighteen years of age 2s. 6d., and women 1s. 3d. It is estimated that the advance will add another £8,000,000 to the aggregate wages bill of our railway systems.

The Certain Penalty of Gas Adulteration.

For some time past, we have been insistently pointing to the dangerous position in which those gas engineers are placing not only themselves, but the gas industry generally, who are showing large makes per ton of coal by the process of adulteration with inert gases, and who are still persistently (notwithstanding the repeated warning) pursuing this path of false economy. It has for a long time been within our knowledge that this matter has been under the close and widespread observation of those who regard themselves as public protectors between Parliament and the suppliers of town gas. In the attempt to shake the stubbornness of some human natures in this particular form of wrong doing, the position has become one for which only plain language is suitable. The "observation" referred to is not going to end in mere passive protest. It is going to lead to very position action; and gas undertakings must be in a position to go before Parliament with—at any rate from now—a clean record in this particular, unless they do not object to come under the certain rigid consequences of the foolishness of their technical officials. In his last week's letter, Mr. W. R. Herring confirmed our own knowledge. "The industry as a whole," he wrote, "will be placed in a dangerous and false position if the factors involved in this problem are not immediately dealt with, as it will inevitably lead to the imposition of restrictions, to which it need not be subjected if common sense is brought into play." And in a letter in our "Correspondence" columns this week, Mr. Thomas Glover speaks of the indebtedness to Mr. Herring for calling attention to the probability of restrictions being imposed if the "reprehensible practices" to which allusion is made are not discontinued. There are the difficulties of the present times. They are well within the knowledge of those who will be the probable prime movers for restriction; and the difficulties are not found to offer any sufficient justification for the excesses that have been discovered.

Is Adulteration Economical?

It certainly is not, regarded from the important standpoints of the much-strained pocket of the householder and the efficiency of the heating operations in manufactories. In some localities, the gas-furnace business is being strangled by incombustible excesses. Nor is adulteration economical from the point of view of the gas suppliers themselves. Self-inflicted damage to business is the reverse of economical; and this is shown—it is the main point of his letter—by Mr. Glover this week. He has been studying the accounts of certain gas undertakings where adulteration and dilution are respectively practised; and his analysis assures him that the cost is from 2d. to 3d. per 1000 c.ft. more where unduly inflated productions are claimed (an exception is made of some installations of vertical retort settings where high makes are obtained under level-gauge conditions) as compared with gas-works where blue water gas is the method adopted for effecting economies in the use of fuel. That is a startling statement; but it is a demonstrable one, when, through the production of gas from coke, a more serviceable mixed gas can be sent out to the consumers than the gas containing an excessive percentage of incombustibles, which deteriorate flame temperature, and take up space in plant, holders, and mains that should be occupied by good combustible gas. In every respect, from capital charges to working costs and consumers' expenditure, inert gases are the enemy of economy and efficiency. We have come to a pass in the matter of high makes per ton where they will always be more or less suspect if not accompanied by an analysis of the gas; and an analysis of the gas would frequently be a certificate not to good, but to bad management. There may be some ugly disclosures of analyses at very inopportune times, unless amendment re-establishes the position of the managements, and revokes the former record. If there is not amendment and the opportunity comes for confronting the managements with analyses of their own heavily adulterated commodity, it will be interesting to see the line their defence will take. We fear there will be humiliation and cause for regret. It is in the interests of the gas industry as a whole that this matter is being kept alive; and there are, we have every assurance, good and substantial reasons for maintaining it in a front place.

Coal Gas for Commercial Motors.

From the reprint of an article appearing in another column, it will be seen that "Commercial Motor" regrets that the prospects of the successful application of coal gas as a fuel for the internal combustion engines of commercial vehicles are not so good as they deserve to be, owing to the absence of sustained effort to make the necessary adaptations. In November last, the President of the Institution of Gas Engineers (Mr. A. E. Broadberry) announced that that body, in conjunction with the British Commercial Gas Association, were undertaking experiments in this direction; and it is a couple of months since that the Executive Committee of the latter incidentally mentioned that a report as to progress had been received from Mr. J. G. Clark. This does not suggest that the results so far are of a favourable kind. Our

contemporary's article, however, sets forth the disadvantages and advantages of the use of coal gas over petrol; but some of the former are attributable to current circumstances. One of them is that the present-day "attenuated coal gas" shows, as compared with petrol, a loss in power in the internal combustion engine of from 15 to 20 p.ct. Now the "attenuation," in respect of loss of calorific value, is only about 5 p.ct. with fairly severe washing for explosive substances; and with ordinary gas-engines, it is found that, with proper air adjustment, the loss of power is only about 5 p.ct. The article speaks of "the poor quality of the gas in certain parts of the country." This may offer an explanation of the disappointment. It may be that those "certain parts" are the ones where an undue percentage of incombustibles is being drawn into the gas—a matter against which in the common interests of the gas industry a strong protest has been made. But "Commercial Motor" regrets that those who complain have not tried the effect of local enrichment by allowing the gas to bubble through oil. It says this might conceivably raise the calorific value by as much as 25 p.ct. It can hardly be necessary to raise the gas to that extent. Taking it that the gas has, after washing, a calorific power of 480 B.Th.U., a 25 p.ct. increase would make it 600 B.Th.U., which is high. However, the relative cost of coal gas compared with petrol ought to induce perseverance. We might point out to our contemporary that for enrichment purposes the crude method of passing coal gas over shallow trays containing enriching liquid is not ordinary gas-making "practice" to-day. Perhaps the writer has the air-gas system in mind.

Raw Materials of the Empire.

The recently issued report of the Dominions Royal Commission is the product of nearly five years' careful investigation abroad and at home. Apart from the gas industry being an important unit in the life and work of the Empire, it is intimately concerned in certain of the proposals of the Commission for rendering the Empire as far as possible self-sufficient, and therefore independent of foreign countries in the matter of primary production by the development of its own vast resources. This, of course, is an ideal economic state. In their conclusions, the Commission propose that a complete survey should be made of the Empire's productions and requirements; and that an Imperial Development Board should be created to undertake this work, and to promote research by the various local Governments, as well as at home. The report is far-reaching. In connection with the contemplated survey of essential raw materials are mentioned nickel, asbestos, petroleum, and nitrates. The Empire in the past has been stupidly generous, by allowing itself to be the source of much of Germany's industrial activity, and therefore of that country's industrial greatness. Many materials produced in the Empire have been shipped to Germany and other foreign countries for treatment and refining; and those countries have been doing business in the treated and refined products with the rest of the world. In fact, this country has been large purchasers from Germany of materials the source of which has been British Dominions. A more asinine condition of things could hardly be imagined. If we can deal with the products of the Empire now, we could have done so before, had not indolence ruled. However, it is recommended that the condition shall now be reversed.

Looking after Ourselves.

Among the examples quoted of the Empire's own products having been taken away for the industrial and commercial sustenance of foreign countries are zinc, tungsten ore, and monazite. Since the outbreak of war, steps have been taken by the Imperial Government to secure control and protection in these cases; and the Commission now suggest the extension of this policy. Where we are dependent upon other countries, the Commissioners urge that the proposed Imperial Development Board should consider the possibilities of new sources of supply, or of substitutes. In view of the importance of petroleum, it is recommended that, where in any part of the Empire an extensive oil-bearing area is found, steps might be taken to reserve, apart from Admiralty requirements, some portions of the production for public purposes. It is also rightly considered to be desirable to make the principle of local refining of general application. Nitrates and potash are cited as examples of commodities not available within the Empire for which substitutes might be found. Utilization of the water power of Canada and New Zealand is recommended for the production of synthetic nitrogen compounds, and that the immense deposits of peat in Ireland, Canada, and elsewhere might be utilized as fuel and agricultural fertilizers. The report is a document that is alive with potentiality for all the component parts of the Empire; but some of the ideas would have to be subject to the closest scrutiny of expert men, so as not to be developed in any haphazard manner.

Devon's Opportunity.

The recent appointment of a new branch of the Ministry of Munitions to deal with the examination and development of such mineral properties, other than coal or iron ore, in the United Kingdom as are considered to be of special value for purposes of the war, has led Mr. T. Settle to address a letter under the above heading to the local press, in which he emphasizes the claims to attention in connection with this matter of Devon—and especially Dartmoor. Mr. Settle does not, of course, speak without authority on the subject; for he has been manager of a Dartmoor tin mine and an Okehampton arsenic mine, besides doing a great deal of other work of a similar character during his twenty years' experience. It is to be hoped, therefore, that heed will be given to his plea for combined action for the development of the mines. The information he is able to furnish as to the tin ore of the Chagford, Murchington, and other districts will also no doubt receive full consideration at the hands of the Ministry of Munitions. There has, he contends, never been anything to prevent successful and profitable working of Devon mines, except that it was easier to buy foreign ores. The excuse named certainly no longer possesses any solid foundation. Mr. Settle's injunction to Englishmen, to "Help yourselves to what is your own," may be applied in other cases than that of the Devon mines.

The Housing Problem.

In a paragraph which appears on another page of this issue, attention is drawn to the enormous prospective demand for gas appliances in connection with the new houses that will require to be built on the termination of the war. This housing problem is already the subject of earnest consideration—a fact which is easily understandable when the magnitude of the figures involved is seen. As an instance, it may be noted that, addressing a deputation some days ago, Mr. Hayes Fisher (the Parliamentary Secretary to the Local Government Board) declared that after the war there would be a shortage of half-a-million houses in England and Wales. With the idea of formulating some definite policy, a conference has been held at Oxford, under the auspices of the National Housing and Town Planning Council; and as the result of three days' discussion, a number of conclusions were arrived at. One of these was that the Government should announce that at the close of the war housing loans and grants-in-aid will be available for use by local authorities and other agencies to be defined by the Government. Definite classes and types of houses were suggested for England and Wales; and the questions of legislation and the cost and supply of building materials were also dealt with. In the press of other matters, further developments in connection with the solution of this important problem should not be lost sight of.

On May Day, the Faraday Society are having a general discussion on "Osmotic Pressure." It is a subject that has no immediate interest for our readers. But the announcement of this coming event informs readers that among those who will be contributing to the discussion is Prof. H. E. Armstrong. Osmotic pressure does not strike one as an exhilarating subject; but anyway it is to be hoped that Prof. Armstrong will be more at home with it than he has been in his random attacks on the technical men of the gas industry, and in his prognostications of a disastrous fate for the industry if it does not follow his advice, and scrap its carbonizing system and at once enter upon low-temperature carbonization.

The Gas Light and Coke Company have arranged a demonstration at their furnace show-rooms, No. 146, Goswell Road, E.C., of Messrs. John Wright & Co.'s gas-heated furnaces for melting, annealing, hardening, tempering, forging, and re-heating metal, &c., together with specially designed furnaces for war work and industrial requirements. The exhibition was opened yesterday (Monday) by Mr. D. Milne Watson, the Managing-Director of the Gas Light and Coke Company, and thereafter Mr. Shipley N. Brayshaw, M.Inst.Mech.E., delivered a lecture on "Gas for Industrial Purposes." Demonstrations will be given daily from 11 a.m. to 1 p.m., and from 2.30 to 5.30 p.m.—on Saturdays from 11 a.m. to 12.30 p.m.—and the exhibition will remain open until May 12.

PERSONAL.

Mr. C. P. MYERS has resigned the position of Engineer and Manager of the Troon Corporation Gas-Works, and has been succeeded by Mr. M. C. MACFIE, Assistant Gas Manager at Stirling.

Mr. T. H. BYWATER, Head Chemist at the Grimesthorpe works of the Sheffield United Gas Light Company, who is leaving to take up important scientific work, has been presented by his colleagues with a travelling bag, as a mark of esteem. Mr. Bywater has been at Grimesthorpe for the past twenty years.

It was the pleasing duty of Mr. Edwin Upton, the Treasurer of the Liverpool Gas Company, on the 5th inst., to felicitate Lieutenant ATHELSTAN C. SHEPHERD on his military honours, and to present him, on behalf of the office staff, with a double-cased gold hunter watch. Mr. Shepherd's military career commenced in August, 1914, when, though under 18 years of age, he volunteered for active service, and finally enlisted in the 9th Battalion of the King's (Liverpool) Regiment. Subsequently, injuries necessitated his return to England; but meanwhile gallant conduct in the battle of Richebourg gained for him the reward of a Commission. Rejoining his regiment in France, he again distinguished himself; being awarded the Military Cross last September. In November, his name appeared in despatches.

The Glasgow Corporation Gas Committee recommend that the salary of Mr. ALEXANDER WILSON, the General Manager and Engineer, be increased from £1000 to £1150 per annum. Mr. Wilson's present salary was fixed on his appointment in 1903; and in 1907 he was granted free house, coal, and gas. It is also recommended that Mr. RALPH HALKETT, the Commercial Superintendent, be appointed Assistant General Manager, at a salary commencing at £700 per annum. Mr. Halkett's present salary is £550; and his last increase was granted in 1915, when the survey and complaints departments were put under his supervision. It is further recommended that increases of £50 per annum be granted to the four Works Managers—Mr. Alexander Smith (Tradeston), Mr. John Webster (Provan), Mr. Andrew M'Leod (Dawsholm), and Mr. John Fraser (Dalmarnock).

OBITUARY.

SAMUEL WOOD, F.C.A.

The many friends of Mr. Samuel Wood will learn with great regret that he passed away on the 10th inst., after a short illness, at the age of 67, at Rievaulx, St. Mary Church, Torquay, to which address he had just removed; and he was laid to rest in the same grave as his wife in Norwood Cemetery yesterday (Monday).

The son of Mr. Thomas Wood, a journalist, he was born in Hull, and educated privately and at the City of London School and King's College. He was admitted to the Institute of Chartered Accountants in 1883; commenced to practise in 1887; and was elected a Fellow in 1892. For many years he was in partnership with Mr. E. W. Drew (Messrs. Wood, Drew, & Co., Chartered Accountants), and soon became prominent in parliamentary and arbitration proceedings in connection with gas and water undertakings. He was engaged in the arbitration proceedings in connection with the transfer of the New River, Grand Junction, and Lambeth Water Companies' undertakings to the Metropolitan Water Board, and was Sole Arbitrator appointed by Special Act in the transfer to the local authority of the Devonport water undertaking.

He was at one time Honorary Auditor to the Society of Engineers, and at the time of his death Auditor to the South Suburban, the Exeter, and the Basingstoke Gas Companies. Mr. Wood was a Freemason and a member of the "Evening Star" Lodge.

Since his retirement from regular practice in 1909, he devoted himself to many useful pursuits, and was ever-ready to help any good cause. Philology was one of his favourite studies; and he frequently lectured to learned audiences on the growth of the English language. Mr. Wood travelled widely, and his descriptions of his visits to places of interest in Europe, Asia, and Africa were the delight of those privileged to listen.

A wide circle will mourn the passing away of a man of sterling character, marked ability, and a true and faithful friend.

The death has occurred of Mr. MALCOLM BROWN MURRAY, J.P., the Chairman of the Dundalk Gas Company. Mr. Murray was an able business man and a judicious administrator, who took a lively interest in gas affairs, and especially in the development of the Dundalk undertaking.

Early this year, the gratifying fact was recorded in the "JOURNAL" that Second-Lieutenant REGINALD ARTHUR BROWNING, of the 20th Battalion of the Northumberland Fusiliers (1st Tyneside Scottish), had been awarded the Military Cross. Unhappily, however, he has lived but a short time to enjoy his distinction; for news was a few days ago received that he died of wounds in France last Tuesday. Lieutenant Browning was the only son of Mr. E. W. Browning, who, since his retirement after many years' service with the Gas Light and Coke Company, has been residing at Leigh-on-Sea. The deceased was 23 years of age.

The death occurred early last Thursday of Mr. ALEXANDER F. WILSON, of Balfron, who for upwards of 30 years had been a Director, and for 27 years (till February, 1910) Chairman, of the Aldershot Gas, Water, and District Lighting Company. One of the older school of gas men, he had varied experiences in the course of his very many years' connection with the profession. As long ago as 1853, he entered the service of the then Dundee Gas Company as a clerk; and nine years later he came to London to take the position of Deputy Superintendent Engineer of the Phœnix Gas Company. Subsequently, he spent some time in Para; and in 1874 he first became associated with Aldershot. His chairmanship of the Company dated from March, 1882; and on the completion of 25 years' tenure of the office, he was presented by the employees with an illuminated address and a loving-cup, suitably inscribed, as tokens of their esteem and regard.

Mantle Lighting Investigations.

The U.S.A. Bureau of Standards has been conducting an extended investigation on the influence of various factors on the efficiency of lighting in gas-mantle lamps of different sorts; and a report on the subject is in preparation at the present time. One of the most important factors studied is that of changing gas supply; it is mentioned in the "Transactions of the American Illuminating Engineering Society." This work has indicated that gases of low heating values are slightly more efficient for mantle use than gases of high candle power; but the differences are, in general, small, measured in percentage change in lumens per B.Th.U. per hour under different conditions. In order to determine the relation between these laboratory results and the conditions in practice, inspections have been made of more than six thousand mantle installations in ten different cities. The conditions of mantles, glassware, pilot lights, &c., were inspected; and summaries of the conditions of the lamps have been prepared. The very striking influence of the value of regular attention to the lamps is brought out by these results.

The Use of Private Railway Wagons.

It will be remembered that certain railway companies recently decided to utilize private owners' wagons on the return journey. The Government has now resolved that this principle shall become general on all railways, and have consequently issued the following regulations: "(1) Where a private owner's wagon would otherwise be sent on a journey empty, the Board of Trade may take possession of the wagon for that journey, and give such directions with respect to the cases in which possession is to be so taken and the use and loading of a wagon of which possession is so taken as they think fit. (2) Where possession is so taken of a wagon, there shall be paid to the owner for the use of the wagon such amount as may be agreed or as may be determined, in default of agreement, by the Railway and Canal Commission or by an arbitrator appointed by that Commission. (3) The owner of any wagon and any other person affected by directions given under this Order shall comply with any directions so given, and give all reasonable facilities for carrying out those directions. (4) Any person acting in contravention of, or failing to comply with, any of the provisions of this Order is guilty of a summary offence against the Defence of the Realm Regulations."

A Bibliography of Naphthalene Technology.

A compilation which does not pretend to be complete, but which it is hoped contains the references to published articles on the subject of naphthalene that are of real importance to the gas engineer and gas-works chemist, has been made by Mr. W. T. Layton, of the South Metropolitan Gas Company. Originally, the bibliography was prepared for the use of certain officers of the Company; but recognizing that it may be equally useful also to a great many others, the Company express their willingness to send copies free of charge to any persons interested in the subject who may apply by letter to the Chief Engineer, at No. 709, Old Kent Road, London, S.E. Those who take advantage of this offer will find that the bibliography covers the period from 1868 to 1917, and that it contains over a hundred references to distinct articles, &c., on the naphthalene question. A hint is thrown out in a prefatory note that in less strenuous times the compilation may be revised, extended, and improved. This further work will, of course, be welcomed; but in the meantime what has already been done should prove valuable to the many engineers who are experiencing naphthalene troubles. Its appearance is particularly timely, so soon after special attention has been directed to the matter of naphthalene stoppages by the issue of the Institution of Gas Engineers' pamphlet. Among all the remedies that have been suggested and applied, Mr. Layton mentions an apparatus "consisting of a short barrel containing gunpowder, which could be screwed on the end of a naphthalene-choked service. A percussion cap was fitted to a nipple, and struck with a hammer; and the result was in accordance with the immutable laws of Nature." This was within the last half-century; but the method described has quite an old-world air about it now. There has, as the references show, been a large amount of investigation since then.

ELECTRICITY SUPPLY MEMORANDA.

The untoward circumstances of 1916—the high prices of coal and freights, labour difficulties, lighting restrictions (including the Summer Time Act), and appreciation of costs generally—had their effects upon the working of the Electric Supply Companies operating in London and the suburbs, the same as they had upon the London and Suburban Gas Companies. On the whole, however, dividends were maintained at the level of those for 1915, though there were two or three slips from former payments—one of them wiping-out entirely the dividend on the ordinary shares of the London Electric Supply Corporation, and bringing down the dividend on the preference shares from 6 p.ct. to 3½ p.ct. The maintenance of dividends generally at the 1915 level is something for which the shareholders should be thankful. They are not, as are most gas companies, under the operation of a sliding-scale which makes no provision for meeting a period when the whole of the economic conditions on which the system of price and dividend is based have been as effectually mined and shattered as have been the unfortunate towns in Northern France by Prussian villainy. On the score of a reduced, though in the circumstances fair, profit on their investments, the shareholders of the companies have not anything much of which to complain, though, if they have any heart, they can sympathize with their less fortunate contemporaries who have invested money in struggling electricity concerns operating in some of the less luxuriant areas of the country. However, the Chairman of the London Electric Supply Corporation (Mr. R. H. Benson)—the Company whose shareholders have been so hardly hit—has recently had his grumble, though not working under a sliding-scale that is totally unfitted for these extraordinary times. Parliament, he says, has always been most jealous lest such companies should make too much money out of the general public. Now that all theories are in the melting-pot owing to the war, he hopes that, when peace comes along, the policy will be reversed of favouring consumers at the expense of producers of necessary products, and taxing producers up to a point at which they are unable to save money, but may positively lose it. Unprosperous concerns, in his opinion, are a positive economic danger to the community. He does not believe in taxing the thrifty producer and favouring the extravagant consumer; and he thinks the war has convinced us of our folly. That this is true will be the fervent hope of some gas proprietors who in these times, when the drain upon their pockets is great, find their dividends have lost much flesh through the operation of sliding-scales with standard prices at points that were never arranged with a protecting margin against unusual circumstances. But perhaps the current year will further affect electricity dividends, as it is bound to do, and probably (in larger degree) many gas dividends. The opening of the year has given some increased output for heating by the consumption of current by those people who, by using electric heating appliances, tried to alleviate the personal discomforts of atmospheric temperatures several degrees below freezing-point. But this year coal will be dearer than ever, labour the same, and all along the line there will be a hardening of already enhanced costs, while the fogs and dark weather that obtained before last Christmas may not precede next Christmas. The Summer Time Act will also have longer effect. The fortunes of this year are speculative in the extreme, although some of the supply companies have further raised their charges to the consumers.

Electricity Dividends and a Complaint.

Seaborne v. Railborne Coal, and Deteriorated Quality.

In the matter of coal supply, the Metropolitan electricity stations that are situated on the banks of the Thames have had experiences similar to those of the riverside gas-works. In the case of the London Electric Supply Corporation, whose generating station is on the river at Deptford, the cost of coal last year was upwards of 10s. per ton more than in the previous year. Prior to the war, the position of the station was, owing to the supply of seaborne coal, the strength of the Company; but in time of war it is their weakness. Freights have increased six times the pre-war rates; and the Company have had to obtain railborne coal delivered the other side of the river, and trans-shipment has been costly and difficult. Much the same tale has been told by the City of London Electric Lighting Company, whose generating station is also on the river. The deterioration in the quality of the coal has likewise been a serious drawback. This point was accentuated at the meeting of the Kensington and Knightsbridge Company, whose cost per ton of 11s. 8d. in 1911 went up to 21s. 6½d. last year, or about 80 p.ct. In their case, the coal has been delivered very imperfectly cleaned, owing to the pressure at the collieries; and the quantity of incombustible material left in it has reduced the evaporative value by some 20 to 30 p.ct. In any development of the electricity supply companies of London, they had better select sites as near as possible to the riverside gas-works, have ample boiler capacity with forced draught, use coke, and so put themselves beyond the pale of the charge that, by their use of coal, they are, to the economic disadvantage of the nation, destroying much that is valuable in it.

Low Power and Heating Prices, and Adverse Conditions.

Towards the close of last year, owing to the fogs and dark weather, most of the London concerns registered increases of consumption upon the corresponding period of 1915; but it is not gathered that any of them can boast of having produced compensation for the lighting restrictions, and so retrieved the consumption position of 1913. In some cases, there have been reductions on the 1915 output; but this is not reflected in the revenue in view of the higher prices charged. In the case of the London Electric Supply Corporation, prices to consumers have gone up. But while last year, the cost per unit increased from 0·64d. to 0·80d., or by 0·16d., the average price received per unit only advanced from 0·96d. to 1·02d. (0·06d). The Company has considerable power connections. It is the one that is paying no dividend upon the ordinary shares, and has suffered considerably during the war by its location on the river side at Deptford. But the average price shows how sensitive, with a large power supply, it is to accretions of cost. The Managing-Director (Mr. R. Stewart Bain) referred to this at the meeting of shareholders. The majority of their large power contracts, he said, were entered into before the war, at rates which then yielded a fair ratio of profit. The extraordinary increase in the price of coal, as well as the inferior quality, had rendered these contracts unprofitable; but he was glad to say that in every case the power consumers voluntarily allowed them to increase the rates from 10 to 20 p.ct. This was kind. Much the same thing was pointed out at the Kensington and Knightsbridge meeting. In the case of this Company, through a revision of discounts, the average price received in 1916 slightly increased over 1915; but the extra income from the lighting units, due to the higher price, was more than cancelled by the additional quantity of low-priced units sold for power and heating. The Westminster Electric Supply Corporation find it necessary to raise their prices for power and heating. Some of the Companies have been patting themselves heartily on the back over the recent increase in the consumption of energy for heating purposes. This, of course, is due to the bad weather; and then not a few of the users of such means of heating would gladly have changed-over to gas-fires. But shortage of labour and fires made the position immutable for most of them. The past extraordinarily severe winter does not, being exceptional, serve as a criterion as to any growing popularity of the electrical method of heating. There is poor value in 3420 B.Th.U. for 1d., or even ½d., for the electricity consumers; and, as to the suppliers, they would have found themselves sorely put to it to have had to face on some days of the winter, as did the gas companies, 30 to 50 p.ct. increases, as compared with the corresponding days of the preceding year—all traceable to the low temperature. There was really nothing else to account for it. Such casual flights in consumption would mean capital, working, and stand-by costs that could not be met at the prices charged for electrical current for heating, and which should be much lower in order to come in line with other heating agents.

Government and Preferential Treatment.

The War Office and other Government Departments have been attempting to incite electricity supply undertakings to break the law. A correspondent of the electrical papers states that the departments concerned, where they take electricity for offices, works, hospitals, camps, &c., make formal requests for special terms. This puts the undertakings in a dilemma, in view of the argument that the supply is required for national purposes, and as such is entitled to special consideration. On the other hand, the suppliers are faced by the enactment in the Electric Lighting Act of 1882, which forbids them showing any undue preference to any local authority, company, or person. While the correspondent in question evidently feels that his patriotism leans towards a concession for national purposes, as a law-abiding citizen he thinks it advisable to keep strictly within the terms of the Electric Lighting Act, and to give quite independently a donation to a hospital or some other good cause. We cannot see why. If the electricity undertaking can afford to give a donation to a hospital or other good cause in respect of a Government contract, why not in respect of the accounts of other large consumers? If they can afford it for one, they can afford it for the other; or, if they leave matters to take their course, perhaps the excess profits tax, if the undertaking is inordinately lucky, may put things right. However, we must not argue against contributions to philanthropic objects, no matter the ground on which they are made. The correspondent in question thinks, if his suggestion is adopted, it would produce consistency of action throughout the industry. The gas industry is doing a considerable business with munitions works, military camps, canteens, hospitals, &c.; but in the case of certain undertakings of which there is intimate knowledge, the plan of progressive discounts according to consumption brings Government Departments into line with other large consumers.

Economy from Modern Small Stations.

The question of the relative advantages of small as compared with large stations is introduced in a paper by Mr. E. M. Lacey, read before the Institution of Civil Engineers. Of course, the newly-erected small station has the advantage of experience; and, by the application of some modern improvements, it can considerably narrow-down the monetary

advantages with which the advocates of concentration interlard their writings—advantages sometimes inflated by comparison being made with old-fashioned types of plant. Comparison should be between modern concentration and modern equipped smaller stations—such as the one at Walsall. Mr. Lacey claims that the new power station at Walsall is by far the lowest in cost per kilowatt of any yet erected in this country, due to special features in the design and type of plant installed; the special features consisting more particularly in the arrangement of the coal-handling and boiler-house plants. We will not go into details, except to say that the engine-house is designed to accommodate three 4000 KW. turbine-driven alternators, of which two have been erected. The figures show that the cost of a 12,000 KW. station of the design described, at 1914 prices, is approximately £6 12s. per kilowatt. The capital expenditure was £79,237; the life of the plant is estimated at 25 years; and the load factor is 30 p.ct. The operating expenses, including coal at 12s. per ton, oil, water, waste, &c., wages, repairs and maintenance, management, and rent, rates, and taxes, come to 0·224d. per kilowatt-hour. The fixed charges bring up the total cost per annum and per unit to 0·290d. This is a low cost, which surprises the "Electrician;" and the £6 12s. per kilowatt arouses some doubt in its editorial mind. Mr. Lacey says:

> One of the objects of the paper is to show that a power station of 12,000 KW. to 16,000 KW. capacity can be so designed as to produce electricity at such a low cost that economy in production due to further increase of capacity is not as considerable as has frequently been assumed. While it may be admitted that the costs of production will decrease to a limited extent as the plant capacity of a station increases from (say) 12,000 KW. to 50,000 KW., yet in many cases which necessitate the transmission of electricity over more extensive areas in order to secure a larger demand, such decrease in the costs of production would not be sufficient to balance the additional costs of the longer transmission system.

Upon this the "Electrician" remarks, in what seems almost to be a dejected tone: "At a time when most of us are striving for the centralization of electricity supply, it is disappointing to read a statement of this kind." Why? We should have certainly thought that our contemporary would have welcomed any advance in economy whether by small or large plants. It considers that all charges must come down to some extent with larger than with smaller sets. The load factor is the important thing; and it is quite easy for a load factor of 30 p.ct. —such as that at Walsall—to be converted to 60 p.ct. in a large station; and with such conversion, the efficiency of the use of capital is doubled. It thinks, too, that it is useless to take a life of 25 years for plant at the present day in any rapidly developing district. It considers the case of the large generating station has been amply proved, and trusts that engineers will not be so ill-advised as to advocate the claims of the small generating station, and thus put back the hands of the clock in regard to electricity supply in this country. In other words, there seems to be regret that a station of the size of Walsall can show such an advance in economy, and that this, to the extent of that advance, lessens the claims of large concentrations of plant. A true engineer should welcome the advance; and unless he can find something really tangible in the way of error about the costs, he should not attempt to belittle the achievement.

Midland Junior Gas Association.—A visit will take place next Saturday afternoon to the Shut End Works, Pensnett, near Dudley, of the Stourbridge Refractories Company, Ltd. In sending out intimation to members as to the arrangements, the Hon. Secretary of the Association (Mr. W. J. J. Pickering) states that the works comprise the most modern plant of its kind in the British Isles.

Calorific Standard Applications.—The Salford Town Council have applied to the Local Government Board for a Calorific Standard Order. No figure was named in the application; but the Department have suggested 500 B.Th.U. Application has been made to the Board of Trade at the instance of the Horley District Gas Company for an Order proposing a calorific power standard of 500 B.Th.U. The Board also intimate that they have made the Orders asked for by the Bath Gaslight and Coke Company, the North Middlesex Gas Company, and the Petersfield and Selsey Gas Company.

Sulphate of Ammonia in India.—Dr. H. H. Mann, Agricultural Chemist to the Government of Bombay, points out that sulphate of ammonia is one of the materials which has promise of very large immediate development in India. The quantity available can be largely increased by establishing coke-ovens in connection with collieries or iron-works; and it is reported that the Tata Iron and Steel Works will be shortly a considerable source of supply. Even now Bengal supplies itself with this material, and exported about 800 tons in 1915. In Madras the material has an established position; while in Bombay the future of no other artificial manure is so promising. It is being used chiefly in mixture with other manures, for tea and other planting crops; and this use will probably extend considerably in the near future, especially in sugar-growing countries. Experiments which have recently been conducted in Western India have proved that, in the black-soil areas of India, for sugar-cane growing, sulphate of ammonia can adequately and satisfactorily replace oil-cake as a top-dressing; and mixed with other artificial manures it has given excellent results with many garden crops.

FORMULÆ AND DATA FOR ENGINEERS.*

In the "Engineer's Year Book of Formulæ, Rules, Tables, Data, and Memoranda for 1917," we have a volume which should, until the succeeding issue comes, be always ready to the engineer's hand for information or verification of (say) formula, rule, or factor drawn from memory. Generally speaking, rules and data applying to the work with which the engineer is in daily contact will remain constant in memory; but mental capacity is not sufficiently great to retain many things with which one only comes into occasional contact or for which one has only infrequent use. For instance, though the trained gas engineer will know as well as the alphabet the commonly accepted standards of dimensions and capacities of plant for any given amount of work, he may not be so at home with common rules applying to, for example, electrical engineering, sewage work, hydraulics and water power, beams, girders, bridges, and joists, reinforced concrete construction, and much else in the diverse branches of engineering practice. And yet at times his own work may occasion reference to these rules. When wanted, they are not always easy to discover among the multitude of text-books; and it is the value of Mr. Kempe's work that he has brought together countless items of information within a pair of covers, to which we may hope the publishers have allowed a margin of safety, as they have placed upon them considerable stress owing to the mass of pages. To the busy engineer, the book means a saving of time; for, by the aid of an extended index, there is fair certainty he will find in it the particular information he needs.

In the beginning of the book, is a "Summary of Engineering Progress" during 1916. But the "progress" that took place last year in gas engineering appears to be confined to the adoption of oil-washing plant for the extraction of benzene and toluene from gas, the installation of plants for tar dehydration, and the development of the purification and concentration of ammoniacal liquor into liquor ammoniæ. The high price of coal last year is referred to, which is "progress" in the wrong direction; and the negative result of trying to get gas men to carbonize pitch to keep down its accumulation does not denote advance. On the other hand, the Gas (Standard of Calorific Power) Act, and the development of the use of coke for steam-raising and motor lorries, are distinct advances if not exactly classifiable under "engineering" progress.

Section XXXI. of the book deals with "Gas and Gas-Works Practice." It has been entirely re-written by Mr. Alywne Meade, Assoc.M.Inst.C.E. Of 2151 pages, including the index and a buyers' guide, the section (which embraces information on acetylene and petrol air gas) has only 32 pages allotted to it, and these crown octavo pages. There is not sufficient scope here for dealing with such an extensive subject as coal carbonization for the manufacture of gas and other products, and all that the diverse work entails. But within the comparatively few pages, Mr. Meade has managed to compact a vast amount of useful information, mainly comprising general rules as to gas-works, from coal storage to works' mains—areas, capacities, processes, and products all contribute to the rules and data, as well as the flow of gas in mains, the use of coke for boiler fuel, incandescent gas-burners and mantles, and the prescriptions of the Metropolitan Gas Referees. It is a case of *multum in parvo;* and it is a compendium that will often be consulted, instead of a more copious text-book, though the information, of course, is neither so varied nor so complete.

* "The Engineer's Year Book of Formulæ, Rules, Tables, Data, and Memoranda for 1917." Compiled and edited by H. R. Kempe, M.Inst.C.E., with the collaboration of specialists. London: Crosby Lockwood and Son. Price 20s. net.

A REPORT ON THE EMPIRE'S RESOURCES.

Just about five years ago, in consequence of a resolution passed by the Imperial Conference of 1911, there was appointed a Dominions Royal Commission, of the members of which six represented the United Kingdom, and one each Canada, Australia, New Zealand, the Union of South Africa, and Newfoundland. Sittings were held not only in the United Kingdom, but also in all the Self-Governing Dominions; and as a result of the Commission's labours, six reports and a number of other documents have been presented to Parliament. The Commission, whose Chairman was Lord D'Abernon, had for their main objects to inquire into and report upon (1) the natural resources of the five Self-Governing Dominions and the best means of developing these resources; (2) the trade of these parts of the Empire with the United Kingdom, each other, and the rest of the world; and (3) their requirements, and those of the United Kingdom, in the matter of food and raw materials, together with the available sources of supply. They were also empowered to make recommendations and suggest methods by which the trade of each of the Self-Governing Dominions could be improved and extended. It is only fair to point out that two years ago the Government of the Commonwealth of Australia withdrew their representative from the Commission.

The work has now been brought to an end by the issue of the sixth and final report—a document of 200 foolscap pages, which made its appearance as a Blue-Book a few days ago. With the majority of the fifteen chapters into which it is divided, there

is no need to deal here. The ones which relate to the natural resources of the Dominions are those of most concern to readers of the "Journal." On this subject, the Commission, in their conclusions, point out that it is vital that the Empire should, as far as possible, be placed in a position which would enable it to resist any pressure which Foreign Powers could exercise in time of peace or war in virtue of a control of raw materials and commodities essential to its well-being. A complete survey should accordingly be made of the relation between Empire production and Empire requirements of such materials and commodities. The Commission have themselves collected and present with the report preliminary facts and figures for such a survey. In particular they suggest as lines of investigation the possibility of new sources of supply within the Empire, and the possibility of finding substitutes within the Empire. Further, means of preventing waste in the existing sources of supply of all minerals should be investigated. The responsibility for a survey and investigations on the lines which they indicate should, the Commission say, be entrusted, together with other functions, to a new Imperial Development Board, who should carry out the research work (*a*) in respect of the United Kingdom, through the recently-formed Department for Scientific and Industrial Research, the National Physical Laboratory at Teddington, &c.; (*b*) in respect of the Self-Governing Dominions, through existing Scientific Departments, and the Committees for Research which are being set up there; and (*c*) in respect of India, the Crown Colonies, and the Protectorates, through the local Scientific Departments and the Imperial Institute. The Commission have refrained from suggesting that the Imperial Institute should be used for research work for the Self-Governing Dominions in connection with the scheme, as they are of opinion that the best organization for the future would be that the Dominions should concentrate their efforts on the development of their own research institutions, and that the research functions of the Institute should be limited to work for India, the Crown Colonies, and the Protectorates. It is specially gratifying to note their assertion "after five years' experience throughout the Empire, that the spirit of co-operation, so splendidly demonstrated in war, will be succeeded, after peace is declared, by absolute concord in the great task of reconstruction and development."

Looking at the mineral resources first of Canada, the report refers to the indications that a mineral asset of the Mackenzie basin, and one of enormous importance, is oil; for it appears from the evidence that there exists there one of the largest areas of possible oil-bearing country yet unexplored on the face of the earth. It is estimated that the rocks which are believed to be the source of this oil cover an area of not less than 300,000 square miles. In view of all the facts, it seems to them urgent that a complete survey of this region should be made as early as possible. The coal deposits of Canada amount, according to estimates prepared a few years ago, to about a seventh of the world's known supplies; the estimate for Alberta being approximately a million million tons. A very large proportion of this huge total is, however, lignitic. The best coal is found in the east and the west—in Nova Scotia, Western Alberta, and British Columbia. Nova Scotia coal is of excellent quality, and so abundant that a greatly increased demand could be satisfied for many hundreds of years. Fully one-half of the coal now raised in Alberta is bituminous; while that of British Columbia is of good quality, being mainly bituminous or semi-anthracite. In the latter province, there are enormous deposits of fine-quality coal which can be easily and cheaply developed. Natural gas has so far been found in Ontario, Alberta, and New Brunswick; but prospectors are regularly at work here and elsewhere, with indications that the production may be largely increased.

Practically every mineral of any commercial value is found in Australia. There are enormous deposits of coal throughout the Commonwealth; but unfortunately it is not very evenly distributed. South Australia and Western Australia seem to be not greatly favoured in this respect; while the position of the Northern Territory is not known. It has hitherto been thought that the supply in Victoria was small; but quite recently [as recorded in the "Journal" at the time] it has been ascertained that there are immense deposits of brown coal, which, while hardly suitable for domestic purposes, and not very good for industrial uses, are well adapted for the production of gas for heating and power. There are large deposits of good coal in various parts of Queensland, and also in Tasmania; but the coal area of New South Wales is, in respect both of quantity and quality, far in excess of that of any other part of the Commonwealth. There are no oil wells worked in the Commonwealth; but in some shale fields in Tasmania distillation is in progress.

In the case of New Zealand, where it is thought the available quantity is accurately known, the proved deposits of coal amount in round figures to a thousand million tons, of which three-fourths are not under present conditions likely to be mined. The best coal, which is found in the Westport and Greymouth districts, is bituminous. From one particular mine at Greymouth, there has been a small yield of bituminous and semi-anthracite coal, the coke from which is in no way inferior to the best coke on the British market. Evidence given was to the effect that large supplies of oil were available in different fields; and a Committee of the Commission visited the Taranaki oil-field, where a refinery has been erected capable of dealing with 10,000 gallons per day. However, the quantity produced appears inadequate to keep the refinery working, though the oil is of good quality.

Coal is found in all the provinces of the Union of South Africa, though the main sources of supply are in Natal and the Transvaal. The output in the Transvaal in 1915 was about 5¼ million tons, and in Natal about 2¾ million tons. But these figures of production are, it is said, utterly insignificant in comparison with the existing deposits, which have been estimated to amount in the Transvaal to 36,000 million tons, in Natal and Zululand to 15,400 million tons, and in the other districts to 4800 million tons—or a total of 56,200 million tons, apart from what may be discovered as the geological survey is extended. Of this, it is believed that 55 p.ct. is workable.

The prospects for coal in Newfoundland are regarded as being, on the whole, fairly promising; and several of the fields are undoubtedly good. Development will, however, it is recognized, inevitably be influenced by the price at which coal can be imported from the fields of Nova Scotia, where, as has already been remarked, the quality is excellent and the supply practically inexhaustible. The existence of very large areas of oil-bearing shale has been clearly proved; and the known facts indicate that development would in all probability give extremely satisfactory results. The limited number of tests so far made shows that the shale is similar to the Scotch shales, having produced as much as 30 gallons of crude oil and from 30 to 50 lbs. of sulphate of ammonia per ton. Petroleum has at different times been pumped from wells in the island.

Referring to monazite, the Commission remark that prior to the war the control of deposits of monazite sand in various parts of the Empire, and the manufacture therefrom of thorium nitrate—an essential requirement for the manufacture of incandescent mantles—were almost entirely in foreign hands. Since the outbreak of war, however, the control of monazite deposits in Travancore, South India, has been transferred to the United Kingdom. The production of nitrate of thorium in the United Kingdom has simultaneously been developed; and they regard the position as satisfactory, so long as there is no possibility of the monazite deposits in India again passing under alien control. In an appendix, as to the consumption and supplies of certain commodities in the British Empire, it is pointed out that no specific information is available as to the consumption of thorium nitrate in the United Kingdom; but the estimated consumption of gas mantles during the year 1913 amounted to about 70 millions, of which probably 40 millions, or slightly less, were imported from Germany. It is added in a footnote that the figure most commonly given for the yearly consumption of mantles in the United Kingdom is 100 millions; "but there is good reason to believe that this is an over-estimate." In the year named, in addition to the thoria contained in imported mantles, thorium nitrate to the value of £41,000 was imported. From investigation of various mantles, it appears to the Commission that the average content of thoria is about 0·5 gram per mantle. Thus the amount of thoria required per annum for the entire consumption of the United Kingdom is somewhat over 34 tons; or taking the mantle consumption of the Empire as 100 millions per annum, the amount of thoria required is about 49 tons.

British Association Meeting Cancelled.—The announcement is made that, owing to the restriction of railway travelling and other circumstances arising out of the war, there will be no meeting of the British Association this year. This will be the first time in the history of the Association—since 1831—that the annual meeting has not been held.

Another Use for Gas.—Quite recently two installations for providing a cheap method of ripening green bananas have been put down by the Boise (Idaho) Gas Company, and have been found to be very efficient. The Idaho Products Company have put in five hot plates for the purpose. The bananas are hung from the rafters in air-tight rooms 30 ft. square by 6 ft. high. The hot plates are placed on the floor, one in each room, with a wash-tub filled with water on the burners. Just enough air is admitted to the confined space to allow the gas to burn. A thermometer is placed in each room; and the gas supply is governed to maintain a temperature of from 65° to 70° while the green bananas are ripening. The vapour generated from the hot water does the work.

Under-Water Storage of Coal as a Remedy for Spontaneous Combustion.—Having lost some hundreds of tons of coal by spontaneous combustion last year, the Duquesne Lighting Company, of Pittsburgh, have undertaken, and nearly completed, the construction of a huge concrete basin, capable of containing 100,000 tons of coal below the water-line. It is 791 ft. long, 153 ft. wide, and 25 ft. 6 in. deep, built of concrete slabs 40 ft. × 50 ft., arranged to permit expansion and contraction. The expansion joints are made water tight by means of pitch and tar paper, and are supported on 12-in. concrete blocks. The internal walls have a 1:1 slope, and the outer embankment a batter of 2:1. A stone wall is erected on the top of the embankment, as a protection against erosion at high water, and cranes are provided for handling the coal. The water discharge system comprises four 18-in. pipes fitted with check valves, which permit the water to rise inside the basin when the river rises during flood season, thus guarding against risk of lifting the bottom when the external water level is considerably higher than the internal. Water is pumped in as required, through a 14-in. pipe leading from the power-house to four 12-in. outlets, 160 ft. apart and 6 ft. below the top level of the reservoir.

MANCHESTER JUNIOR GAS ASSOCIATION.

The Seventeenth Annual Meeting of the Association was held at the Grosvenor Hotel, Manchester, on Saturday afternoon; there being a large gathering of members and representatives of the Senior Association. The chair was occupied by Mr. Samuel Carter (of Garston, Liverpool), the outgoing President.

On the proposition of Mr. T. W. Smith, of Heywood, seconded by Mr. W. L. Heald, of Preston, the minutes were certified as a true record of the gatherings.

Annual Report of the Council.

The Hon. Secretary (Mr. James Bridge) presented the report of the Council for the eighteenth session, dating from April, 1915, to April, 1917, in the course of which it was pointed out that the past session had been unique—extending over two years, by reason of the unsettled conditions caused through the war. On April 10, 1915, the number of members was 175; whereas now the membership of the Association was 182. As far as could be ascertained, 25 members were serving with his Majesty's forces. The Council were of opinion that it would be advisable to discontinue the University Lectures during the war; and this course had been followed. The Council regretted that there had not been any papers submitted for the prizes offered by Mr. Franklin Thorp in continuance of the scheme inagurated by Mr. Tagg; and he appealed to the Association to bear this in mind for another session.

On the proposition of Mr. C. E. Teasdale (Salford), seconded by Mr. J. W. Nichol (Radcliffe), the report was adopted.

The Treasurer's Report.

The Hon. Treasurer (Mr. J. Robinson) presented the balance-sheet for the two years ended March 31 last, showing a credit balance of £15 15s. 3d. at April, 1915, and a credit balance of £18 12s. 6d. at March 31, 1917.

Elections.

The President announced that their worthy Hon. Secretary (Mr. Bridge) had been re-elected unanimously for another session. Mr. Robinson had also been re-elected Hon. Treasurer, and Mr. C. Berry Hon. Auditor. The President added that to the position of Junior Vice-President Mr. C. E. Teasdale, of Salford, had been appointed. The following five members had been elected as members of the Council: Messrs. H. C. Applebee (Manchester), F. Dean (Altrincham), E. Hardiker (Bolton), J. W. Nichol (Radcliffe), S. E. Whitehead (Southport). These, together with Messrs. W. Fletcher (Liverpool), A. L. Holton (Manchester), and W. L. Heald (Preston), constitute the new Council. Of the retiring members of the old Council, Messrs. H. H. Mercer (Widnes), Joseph M'Nicholl (Mossley), and W. H. Cummins (Manchester) announced that they did not seek re-election.

A vote of thanks was accorded to the members of the retiring Council.

Mr. J. M. M'Nicholl briefly acknowledged the compliment.

The New President.

The Retiring President (Mr. S. Carter) said they had now reached a stage in the proceedings when he had to announce that he had arrived at the termination of his office as President. It was with mixed feelings that he relinquished the position; and he desired to thank all of them for their kindness during the last two years. They were all anxious to hear what was to be offered for their delectation by Mr. W. Buckley in his Presidential Address. He had great pleasure in asking Mr. Buckley to take the chair.

Mr. Buckley then took the chair amid applause, and said his first duty on doing so was to move a vote of thanks to the outgoing President, who had had a trying two years of office; but he had overcome all the difficulties which presented themselves. He had discharged the duties of office faithfully and well, and had upheld the traditions of the Association. The state of the Association reflected the greatest possible credit upon him.

The vote was heartily accorded; and Mr. Carter suitably acknowledged the compliment, alluding in generous terms to the help he had constantly received from Mr. Bridge and the Council.

Mr. Buckley then delivered the following

INAUGURAL ADDRESS.

Allow me to thank you for the honour you have conferred upon me in electing me to the position of President of the Association. I will use my best endeavour to at all times further the interests of my fellow members. The work accomplished by the Association has more than justified its formation; and although its activities have been somewhat curtailed owing to the war, we all look forward to, and ardently desire, an early cessation of hostilities, so that the work can be again carried on under normal conditions. The position of President carries with it many responsibilities, not the least of which is the delivery of a presidential address. Looking through the proceedings, we find that the addresses delivered by previous Presidents have been of such excellent quality that it is with some degree of temerity I approach the subject.

THE POSITION OF THE CHEMIST.

Having spent a number of years in the laboratory, a few words about the work and status of the gas chemist may not be out of place. We cannot read our morning papers without realizing the important part played by the chemist in this terrible war. The invention and manufacture of high explosives and the recovery and production of materials from which these are made is essentially the work of the chemist. The steel shells in which the explosive is placed, and the guns which fire these shells, at certain stages during their manufacture pass through his hands. At the same time, he is busily engaged with the production of anæsthetics and antiseptics for the alleviation of pain and suffering. With regard to the position of the gas-works chemist, it is rather regrettable that he is not always given the opportunity or encouragement to do his best for the undertaking with which he is connected. Co-operation between the chemist and manager should always lead to increased efficiency; but I am afraid that some managers do not look upon the chemist with a very favourable eye. Why is this? The business of the chemist is to find and report the truth; and as the truth is at times unpalatable to the manager, perhaps this may account for the friction which at times exists between the two parties.

The manufacture of coal gas is essentially a chemical process, or series of chemical processes. From the time the coal is placed in the retort to the delivery of the gas through the governor—in fact, until the gas is finally consumed, whether it be for light, heat, or power—the chemist can be of great assistance. When purchasing coal, it is advisable that a sample should be examined in the laboratory. A proximate analysis is generally sufficient to give the chemist a good idea as to how the coal will behave in the retorts; and this information may be of great utility especially where continuous vertical retorts are used. The quantity and general appearance of the ash will usually indicate whether to expect much trouble in the producer. The behaviour of the coal during the test for volatile combustible matter will be an index as to its behaviour in the retort—*i.e.*, whether it will swell much or not—and, in addition, I feel quite convinced that a careful examination of the coke produced during this test will tell the experienced chemist whether the coal will be a quick carbonizer or otherwise.

When carbonizing the coal it is necesary that the retorts be maintained at a temperature which will give the maximum yield of gas per ton, and yet at the same time the fuel consumption shall be as low as possible. It is not much use incurring the increased cost of a gaseous fired setting and still use a high percentage of fuel; yet it is known that this sometimes occurs. At some works where the value of the chemist is realized, the retort settings are placed in his charge, and he is held responsible for the carbonizing results. This is as it should be. Make a man responsible, and if he be a conscientious worker he will use his best endeavour to justify the confidence placed in him. A saving of even 1 p.ct. of fuel on a works carbonizing 50 tons of coal per day will more than pay the remuneration offered to the chemist by many undertakings. This question of remuneration is a somewhat delicate one. To attract the best men to the profession—and the best is always the cheapest—adequate salaries should be paid; and I am afraid that until recent years this was not done. The training of a chemist occupies a number of years, during which period he must work and study hard to fit himself for the position to which he aspires; and it is but reasonable to expect that, when he enters on his duties, this will be taken into consideration. In the gas industry new problems are constantly cropping-up; but the chemist, with his knowledge of the fundamental principles and laws which determine chemical reaction and change, is generally able to elucidate these problems.

The careful supervision of the washing and scrubbing plant offer in many cases plenty of opportunity for increasing the revenue of the department. Every grain of ammonia retained in this plant represents hard cash. The major portion of a chemist's time will, of course, be spent in the laboratory, where, in addition to the testing of gas for its purity, composition, &c., there are residuals to be examined and reported upon. Gas departments are purchasers of large quantities of materials for use on the works; and in this connection the chemist can protect the interests of his employers. All is not gold that glitters; and materials supplied are not always what they are represented to be. To mention one instance only, there is paint *and* paint. It is certainly not economical to buy paint which contains baryta, because this material is heavy, and has very little value as a protective material; yet at one time this was a common adulterant.

Makers of appliances in which gas is consumed have during recent years found it necessary to employ highly-trained scientists and furnish well-equipped laboratories to ensure that the apparatus supplied for whatever purpose it may be used—whether for lighting, heating, cooking, melting, brazing, annealing, &c.—should give the maximum efficiency. On the part of the gas authority it is advisable, when consumers send in complaints regarding the quality of the gas (and, of course, if anything goes wrong it is always the gas which is at fault), that they should have at their disposal at least one who, having a knowledge of the composition and behaviour of gas under varying conditions, will be able to point out to the consumer the cause of the trouble. Such a one is the chemist. This, of course, applies more particularly when the complaint comes from a consumer who is using very large quantities of gas for industrial purposes. The majority of complaints are trivial, and can be dealt with by the ordinary inspector.

It was my intention to have specially dealt with one particular section of the chemist's work—viz., gas analysis; but I find that it is impossible to do justice to the subject without taking up much more time than is at my disposal. I have spoken plainly (perhaps rather bluntly) on this question of the position of the chemist in a gas-works; but I feel he has not always received fair treatment. The war, however, has undoubtedly proclaimed his value, and thereby materially improved his status. The wo k

is interesting, and at times fascinating; so that, given reasonable prospects, the best of our young men will be attracted to the profession. A couplet which for many years has appeared on the cover of a certain magazine expresses the spirit which should exist between the chemist and manager. It reads thus:

> By mutual confidence and mutal aid,
> Great deeds are done and great discoveries made.

In place of the somewhat lengthy notes on gas analysis, I have substituted a few personal experiences with vertical retorts, which may perhaps prove, if not useful, at least interesting.

VERTICALS: SOME EXPERIENCES.

At Droylsden, where I am at present stationed, the carbonizing plant, as most of you are aware, consists of two settings of eight retorts on the Glover-West system. This installation was the first erected by West's Gas Improvement Company after the experimental plant at St. Helens. Gas making commenced on July 12, 1910, and from that time to the present nothing but—shall I call it vertical?—gas has been produced at these works. New retorts were placed in one of the settings (No. 2) during the summer of 1915. This section commenced gas making on Dec. 3, 1915, and has been put out of action this week; so they have been making gas continuously for sixteen months. Very few repairs are required—a little patching of the lining of the producer and the podging of a few small cracks being all that is necessary. No. 1 setting had the retorts renewed last year, and we do not expect that they will be let-down for repair until the summer of 1918.

When the retorts were first put into commission, our late Engineer (Mr. J. G. Newbigging) deputed me to carry out a series of tests on the plant, to inquire into the possibilities of the system; and the results of the first series of tests were made public in the paper "The Scientific Carbonization of Coal," which Mr. Newbigging read at the meeting of the Institution of Gas Engineers held in Glasgow in May, 1911. Since then, further tests have been carried out; and the results obtained have fully confirmed the figures given in that paper.

When a new plant is erected at a works, the wise manager will anticipate that there will be preliminary difficulties, and more so if the system adopted is of an entirely new type. Needless to say, we were not spared these troubles. One of the sources of our trouble was the hanging-up of the coal in the retort. The men, being new to the plant, sometimes did not find out that this had occurred until, on going to discharge the coke from the coke-chamber, they found that there was very little to discharge. At the present time, and in fact for a very long period, we have had no trouble in this direction. During this year we have used the long rod on three occasions, and the time occupied in each instance has been only a few minutes. There are two main causes of hanging-up. Sometimes a portion of the scurf which has accumulated on the retort will break-away, leaving a small ledge which interferes with the free passage of the coal through the retort. Later experience has proved that this occurs more frequently when the retorts are new than when they have been in operation for some time. Another cause of trouble is carrying too high a vacuum on the collecting main. As the travel of the gas from the retort to this main is in our case a very short distance, it naturally follows that the gas, $+ x$, due to over-exhausting, is at a high temperature; and this tends to rapidly thicken the tar in the take-off pipe, which gradually becomes blocked and throws pressure on the retort. The interference of the free passage of the gas from the retort to the foul main appears to make the semi-carbonized coal more pasty than usual, and there is a tendency to hang.

In this connection, it is perhaps as well to mention that the distribution of heat around the retorts also has a great influence on the behaviour of the coal in its passage downwards. Too high a temperature at the top gives excessive heat to the gas leaving the retort. I have already pointed out that this condition tends to induce hanging-up. At the same time too low a temperature is objectionable, because apparently this tends to get the coal hanging at the neck—*i.e.*, just at the bottom of the coal-feeding hopper. An experienced stoker knows almost immediately when this particular type of hanging has taken place. Naturally there is always a small amount of tar about the top plate which carries the ball-valve; and if on visiting the charging stage smoke is seen slowly rising from this plate, one can be almost certain that the coal is hanging at the neck. The appearance and behaviour of the smoke is quite different from that which rises owing to the take-off pipes being more or less blocked up.

With regard to this distribution of heat in the setting, my own practice is to carry the maximum temperature at the four middle combustion chambers. This will be about 1100° C. The top combustion chamber is about 700° to 800° C., and the bottom from 600° to 700° C. Such conditions give excellent results at Droylsden. Yet I have seen other vertical retort installations giving every satisfaction with the retorts hottest at the top. Statements like these appear to contradict each other; but, so far as I know, both are perfectly true. There is scope here for an interesting paper on the distribution of heat in a vertical setting, its effect upon the products obtained, and working conditions. But, however careful one may be in regulating these temperatures—and this is not difficult once one knows one's setting—it is absolutely essential that the plant is worked with a minimum pull on the retorts. Over-exhausting in an attempt to obtain high yields is fatal to the easy and smooth working of verticals. As nearly a level gauge as possible at the top, a clean bright coke at the bottom, and the make will look after itself. One may not always get the maximum daily output, especially when carbonizing a fairly large percentage of slack with the coal; but one is sure that the coke produced contains a minimum quantity of volatile combustibles, and therefore the maximum yield of products per ton carbonized must be obtained.

The take-off pipes are cleared every twenty-four hours; each stoker having allotted to him a certain number, and it is not often he has to give attention to any but his own. This, I think, compares favourably with the ascension pipes from horizontals worked at high temperatures, where it is found advisable to auger the pipes prior to the commencement of each charge. Pitching in the collecting main and deposition of salts in the retort-house governor at one time gave some trouble; but it was pointed out in the short paper read before the Association on March 6, 1915, that this was to a large extent caused by ammonium chloride being deposited; and since we commenced to supply the mains with ammoniacal liquor, we have had practically no trouble.

The recital of these few experiences will, perhaps, lead some of you to believe that the continuous system of carbonization is a very troublesome one. But it must be remembered that all of these occurred during the first few months the plant was in operation. At the present time the plant at Droylsden is giving every satisfaction. The make per day is often more than the guaranteed capacity, and the yield per ton satisfactory.

It has taken more than 100 years for carbonizing in horizontals to reach the high state of efficiency of the modern settings; and it can hardly be expected that a system which is only about ten years old will be as well understood as the older type. We cannot leave this subject without mention of at least three points which are certainly favourable to the system—viz., the gas produced is of an even quality (with a low nitrogen content), the fuel consumption is low, and naphthalene is present in such small quantities that it does not give trouble in the distribution system. I look forward to the time when, by certain modifications of the plant, it will be possible to obtain a coke which will readily ignite in an open fireplace, produce a tar which is almost free from solid carbon, and when stopped pipes and pitched mains are unknown. This may sound Utopian; but I am sufficient of an optimist to believe that such a time will come.

It has not been usual to criticize the President's address; but to-day we are having a discussion which will be opened by Mr. Tagg on the work of the Association. I trust that you will enter heartily into this discussion; and as the remarks made and suggestions offered will no doubt have some connection with the chemical aspect of our business, you are at liberty to discuss this address should any so desire.

Congratulations to a Past-President.

At the conclusion of the address,

Mr. W Hill said he had been asked to move a vote of thanks to Mr. Buckley, but before doing so he should like to mention the name of a Past-President—Mr. S. E. Halliwell, of Littleborough—who, as they all knew, was shortly going to leave them, having been appointed Secretary to the Bristol Gas Company, a post he would fill with credit and distinction, both to the Directors and himself. There was no doubt about it that Bristol had got hold of a very good man. Going back to the address of Mr. Buckley, his contribution showed what type of man they had chosen to be their commander in the 1917-18 session—a type of leader they needed in these strenuous times.

Mr. W. H. Battersby (Bury) seconded, and said he was glad that the President had alluded in such appreciative terms to the work of the man in the laboratory—the gas-works chemist. The President's experiences of vertical gas making, if he could refer to it as such, were most interesting and profitable.

The President, in returning thanks for the vote of appreciation of the address, confessed that he felt conscious of its shortcomings; but he had taken the opportunity of showing that there were in gas-works laboratories any number of available young men who, if properly treated, would be a most valuable asset to the gas industry, and whose aim was the advancement of the profession. As gas engineers, they had, of course, to meet strenuous and, at times, unfair competition. Therefore it behoved the senior members to embrace every available opportunity of increasing the efficiency of their works. He (the speaker) was convinced that they could be materially assisted if they would give the chemist a fair chance. He had great pleasure in calling upon Mr. Tagg to open an informal discussion on

The Work of the Association.

Mr. Tagg said his first duty was to add his note of congratulation to the President on his address—an eminently practical and sound contribution in every way. He agreed in a very great measure with what he had said about the employment of technical assistants—he would not confine it only to chemists. But the difficulty did not lie solely with engineers and managers in not availing themselves to a greater extent of their services. Gas committees—he was speaking now more particularly of corporations—frequently failed to recognize the importance of technical assistants; and some of them were loth to pay the salaries which technical assistants should receive. It was not, he reiterated, always the engineer who was at fault. Very often it was the gas committee that needed educating to the value of technical assistance on a gas-works. Representing the Manchester District Institution on their Association, he suggested to the Council the desirability of discussing the work of the Association, with the object of increasing its usefulness; and he accepted with pleasure the President's invitation to open the discussion, as he was convinced—after a membership of over fifteen years—of the value of the Association. He believed that in the industry generally, and in the Technical Press, there was an ever-

growing appreciation of the work of the Junior Associations. It was because he believed that their future lay very largely in their own hands, that he suggested this discussion, in order that proposals might be brought forward for making their work even more useful than it had been in the past. Every man's future was, very largely, in his own hands; and it depended to a considerable extent upon the manner in which he availed himself of the opportunities that came before him. An Association like theirs offered facilities for exchange of opinion, indicated lines of study and lines of research, widened their knowledge through visits to works, and became such a valuable agency in so many ways that, in self-interest alone, members should try to develop its work to the fullest possible extent. There could be no doubt that the preparation of papers, discussion of technical subjects, and visits to other works benefited all who took part; but it was questionable whether they got the maximum benefit under existing conditions, particularly (say) in regard to visits of an educational nature. He suggested some two or three years ago that short papers should be written following visits to works, with the object of encouraging, perhaps, more particular notice to be taken of some feature of interest in going round the works, so that they went away after the visit with some definite fact in their mind—not a general impression formed of a works, but something more than "general knowledge," something more than they possessed before they visited them. He was sorry to hear, from the report of the Council, that there had not been any papers submitted during the past session for the prizes offered by Mr. Franklin Thorp; but he was very glad that the Council had asked members to bear the scheme in mind for the next session. He had another suggestion to make in regard to the preparation of papers and the discussion of technical subjects. With the desire of benefiting all who took part, and of inducing more members to share in the active work of the Association, he suggested that a collective research be undertaken into some particular branch of manufacture or distribution. As a rule, a member did not give a paper unless it was on a subject of which he had had some special experience; and very often there was a reluctance to share in the discussion on that paper unless members had equally had some special experience and could speak with some knowledge on the subject. He believed the Association could do very useful work for members and for the industry if they would select one subject, either manufacture or distribution, and attempt to get to the bottom of it. He invited them to take, for example, the question of purification. Although the practice in most works was similar, the cost would be found to vary from 1d. per 1000 c.ft. sold to a balance on the credit side. Clearly, here was a field for investigation; and if each member made a return dealing with the plant under his control, giving exact particulars as to capacity and arrangement, method of working, the volume of gas dealt with, the average percentage of impurities, the purifying materials used, and the results obtained, this information would assist in determining the conditions essential for economical working. For the guidance of members, and to facilitate the comparison of data, it would be advisable for the Council to carefully prepare a form of inquiry; and after circulating to members a summary of the returns received, the question could be fully discussed with the certainty that a large number of members would be interested and prepared to take part in the discussion. This was work which was well within the scope of members of the Association, because it need not be research involving high technical knowledge. He used purification merely as an illustration of what he meant by his scheme of collective research—if they gave the number of purifiers, their area, the number of tiers of oxide, their depth, the frequency of the changes, the percentage of air admitted, the percentage of sulphuretted hydrogen present, the extent to which revivification was carried on on the floor—all these, and other points (which were simple measurements), were well within the scope of members, and would interest all who were taking part in the proceedings. Apart from this, the information gained would be extremely useful if it was recorded systematically, because information such as this was not found in the ordinary text-books on manufacture. Take the recently issued book by Mr. Alwyn Meade—a very valuable book, by the way—if they turned to purification, they would find it dealt in very general terms with the area required per ton of coal treated. If such an arrangement as he (Mr. Tagg) suggested were available for (say) a dozen or twenty works, giving the area of boxes in relation to the make of gas, they would have very useful data available for reference; and the information gained would be useful to everyone engaged either in the design or working of plant. If such an investigation proved successful, there was an ample field for extension; but the value of the work would lie in its accuracy and completeness, rather than in the extent of the ground covered. He thought the members would find their chiefs would encourage work on the lines he had suggested; and although the present was not the most favourable time to undertake it, if they approved the idea the subject and form of inquiry could be settled by the Council. He sincerely hoped that his definite proposal would receive the criticism of members. He made it in the hope that it would be of value to the Association as well as to the advantage of the members themselves. He had had in mind for some time the advantages of arranging for the exchange of junior assistants from other works for a period of a few weeks, as he believed that such transfer would benefit all concerned. He had already spoken to several engineers who were favourable to the scheme; and he hoped, on the safe return of those who were now away serving their country, to give it a trial. His proposal would be that an assistant should go from (say) Preston to (say) Southport for a few weeks, and share in the ordinary routine of the works; and, in turn, they would receive at Preston the assistant from (say) Southport or any other place, and let him share in the work as it was carried on at Preston. It appeared, perhaps, a difficult matter to arrange at first; but he was sanguine that it would receive sufficient support to give it a trial. This was not a matter which was in the hands of assistants; but he thought it was one which would be well worth ventilating by the Senior Associations. The question of purification was not by any means the only one in which collective research could be undertaken; but he mentioned it because it was capable of easy investigation. There were important subjects on the manufacturing side—sulphate of ammonia, for instance. He thought that if the Council decided to devote a portion of next session to collective research into some particular branch of manufacture or distribution, it would tend to lead to the elucidation of the problem or problems chosen.

Mr. W. Whatmough (President of the Senior Association) thanked the Council for the invitation they had extended to him to attend the proceedings, and said he had listened with delight to the Presidential Address. It was a downright practical address. Personally, he was very pleased at the reference to vertical retort working. He was in sympathy with Mr. Buckley, because he had gone through the same experiences himself. As the author of the paper had well said, the whole secret was in close attention to the working; and providing that this was given, very successful results could surely be obtained. As to Mr. Tagg's reference to the work of technical assistants, he agreed with him that the fault lay chiefly with gas committees; and, as a rule, the difficulty was more to be met with in a medium-sized gas-works than small or large ones. If they could only obtain more support from gas committees for the medium-sized works, they would be able to utilize the services of gas-works chemists to a much larger extent than at present, and, incidentally, to make some further progress in the interests of the gas industry. With regard to the work of the members of the Junior Gas Associations, he thought Mr. Tagg hit the nail on the head when he said that their advancement rested mainly with themselves. Individual effort and determination to get on in the world, together with making the best of one's opportunities for acquiring knowledge, was in a very great measure the medium through which one would attain progress. Ability would, sooner or later, assert itself, and thereby came progress. The suggestion of specializing in certain directions, as indicated by Mr. Tagg, was a capital one, because by centralizing on special work they acquired a thorough knowledge of that particular subject. If the Council adopted Mr. Tagg's scheme of collective research, it would not only benefit them individually, but would be of value to the Association generally.

Mr. J. E. Lister Cooper (President of the Yorkshire Junior Gas Association) said that, as a visitor, he was much impressed by the capital attendance that afternoon. It was a great surprise to him to see the splendid way the members of the Senior Association attended the meetings of the Juniors. He heartily congratulated Mr. Buckley on his address, which was lucid and to the point. Mr. Tagg's suggestion of collective research for Junior Associations was a very valuable one; and he should take it back with him to the Yorkshire Junior Association, with the view to its full consideration by the members.

Mr. C. E. Teasdale also welcomed Mr. Tagg's suggestion regarding collective research. He confessed that he himself came to the meeting that afternoon with an idea on somewhat similar lines; but his scheme did go not quite so far as Mr. Tagg's.

Mr. Joseph M'Nicholl said he did not think there could be any doubt in the mind of anyone as to the utility of such data, if they could be obtained. He hoped that the new members of the Council would see that something was carried out on the lines suggested; and that if the Council decided to carry it out, it would be warmly supported by the members.

Mr. Tagg remarked that the identity of different data could be concealed under a number or a letter. It was not necessary to make it public.

Mr. J. B. Stewart (Rochdale) suggested more attention should be paid to the distribution side.

Mr. S E. Whitehead (Southport) spoke of the value of the University lectures to members of the Junior Association, and hoped these would be continued. He also referred to the value of chemical training, and characterized it as an essential part of a successful gas manager's training.

Messrs. W. L. Heald, J. W. Nichol, F. F. Mooney (Manchester), and other speakers afterwards contributed to a conversational discussion on the subject.

The President said it was evident that it was the desire of members to make the Association more useful than it had been. The views expressed would be considered by the new Council in making arrangements for the next session. Mr. Tagg's suggestion regarding collective research appeared to him to be an excellent one; and they should lose no time in seeing whether the scheme could be carried out, not by the Manchester Junior Association alone, but by other Junior Associations. For instance, they could take one particular subject, and might prevail upon the Yorkshire Junior Association to take another. They could go even further, and enlist the sympathy of kindred Junior Associations, and possibly induce them to take up a topic for collective research. The more one studied the proposal, the more fascinated one soon became with it. There was, undoubtedly, great scope in the suggestion; and they should be very much indebted to Mr. Tagg for it.

Eventually it was decided, on the proposition of Mr. W. L. Heald, seconded by Mr. S. Carter, that Mr. Tagg's scheme should be mentioned by the delegates of the Manchester Association to the Joint Council meeting at Birmingham, with the view to co operation in collective research among Junior Associations on the lines suggested.

Additional Prizes Offered.

The President announced that the Hon. Secretary had received a communication from a gentleman who was present that afternoon by invitation offering two prizes for the best two papers on "Mechanical and Scientific Aids to Successful Retort-House Working." He moved that their best thanks be tendered to the donor.

This was cordially agreed to, and the usual votes of thanks concluded the afternoon proceedings at a late hour.

Owing to the war, the social evening was dispensed with, the members dispersing to their respective destinations after partaking of tea together.

Yorkshire Junior Gas Association.—There will be a meeting of the Association next Saturday afternoon, in the Chemical Lecture Theatre, Leeds University, when Mr. A. Edwards (Chief Chemist to the Leeds Corporation Gas Department) will read a paper on "Gas Washing, Analysis of Products, Application to the Control of Stills."

MANTLE STANDARDIZATION AND MAINTENANCE IN AMERICA.

The Committee on Gas Lighting of the American Gas Institute held a meeting in Philadelphia recently, when attention was given to the questions of the standardizing of mantles and of maintenance. The following account of this portion of the proceedings is from the American "Gas Institute News."

After considerable discussion as to possible ways of standardizing burners, opinion drifted toward the standardizing of mantles as the best and most feasible way of making a beginning. Mr. Conroy argued that if mantles were so standardized there would be a less variety of them, either to manufacture or to carry in stock; that consequently a better and more uniform output should result, with cheapening of cost to the consumer; and that this cheapening would be very marked if the introduction of "rag" mantles were found possible. Mr. Lyon stated that no rag mantles had been found satisfactory thus far, from the lack of a sufficient primary air entrainment; and that, in order to use rag mantles, it was essential to have a pressure within the mantle sufficient to distend it while it was shrinking to its final shape, thus ensuring good form.

It was evident that, in order to initiate such a movement toward standard mantles, the Committee must get into touch with the mantle manufacturers, seeking their advice as to form, weight, method of attachment, material, and then obtaining from each samples of such mantles as they have to offer as candidates for acceptance as standards. This would involve a considerable amount of testing and experiment before the Committee could hope to make recommendations. In order, however, to bring the subject to a definite basis, the following resolution was carried: "That the Committee enter into an investigation to determine the most adaptable gas mantle or mantles for general use for maintenance purposes (such investigation to embrace all the elements of research requisite in a comprehensive study of the subject); and that the mantles as finally endorsed by the Committee be known as the 'A. G. I. Standard Gas-Mantle,' and as such recommended for use by the various gas companies in the country." This work will constitute the present contribution of the Committee towards the standardization of lighting units.

Mr. Hoyt then argued that the most important subject before them was that of maintenance. It was a subject upon which work could at once be commenced. Discussion followed as to the best means of maintenance. It was stated emphatically that one of the difficulties to be met with in any proposed system of maintenance in homes was that not over 50 p.ct. of householders voluntarily accepted maintenance; and, therefore, companies must devise some method which, without waiting for the consumers' request, would open all the houses using gas lighting for periodic inspection and maintenance. Mr. Hoyt stated that such a method was used in Berlin for house maintenance. He had questioned a number of Berlin consumers on the subject; and they stated that they never had trouble with their gas lighting.

Mr. Dutton argued that the question of maintenance was, after all, only a means to an end; and that the end sought was a perfect service to consumers by means of gas lighting—such as would remove any dissatisfaction either with the appearance of the fixture or with the illumination given. This led the discussion at once into the subject of improved fixtures, and how the sale and placing of these could be accomplished. Mr. Dutton was of the opinion that fixtures had been too cheap in the past. They needed a set of fairly well standardized fixtures suitable for the various requirements in residences, shops, and stores. As these were to be of better quality and design, they would cost more; but, on the other hand, when installed they would be so much more creditable to gas lighting, and so much more satisfactory to the consumer, that no difficulty would be experienced in effecting their sale. The increased profit from the sale of these should be returned in the form of wages, in order to effect still better salesmanship, and to offset additional cost in carrying more expensive stocks. Mr. Hoyt at first, apparently, did not agree with this, and laid it down as a general principle that the purpose of gas companies was to sell gas; that every impediment to its ready flow up to the point of consumption and use should be removed; and that if additional expense had to be incurred in doing this, it should be incorporated in the selling price of gas.

The Committee are favourable to the view that universal maintenance should be undertaken through some well devised plan, and that there is adequate justification for charging such maintenance in the gas rate.

Mr. Lyon then advanced the opinion that, while companies were thus improving the appearance of their equipment, and maintaining the satisfactoriness of the service, they would by this very means be carrying on a campaign of publicity; but that such companies would fail in duty to themselves were these facts not made clear by printed publicity as well.

Support for National Defence in America.—Mr. Louis Stotz, the Secretary, has forwarded a copy of the following letter (signed by Messrs. W. Griffin Gribbel, Oscar H. Fogg, and Percy S. Young) which has been transmitted on behalf of the National Commercial Gas Association of America to the President of the United States: "The Board of Directors of the National Commercial Gas Association, at a meeting held in Chicago (Ill.), on March 23, authorized a Special Committee, composed of the undersigned, to convey to the President of the United States its pledge of support in the present emergency, and to tender herewith the facilities of its organization to co-operate with the proper authorities in prompt preparation for national defence." The Council of the Illuminating Engineering Society of America have also passed a resolution offering the Government all the assistance the Society can contribute.

A NEW TYPE OF GASHOLDER.

[Translated from the "Algemeen Handelsblad," March 30.]

A few days ago the Municipal Gas-Works at Leerdam took over, after a trial of several weeks, a gasholder of absolutely new construction, which differs from the hitherto known design in every respect. This is the first plant in Holland; and it was erected by the Municipality of Leerdam on the advice of Heeren J. Adriaanse, of Harderwijk, and K. Blokhuis, of Middelharnis, gas engineers, in consultation with the Manager of the Leerdam Gas-Works, Heer E. A. van Daalen.

The difference between this new and the ordinary gasholder is principally the following: The ordinary holder consists of a costly tank filled with water, in which a bell moves which serves as a reservoir for the gas. The water is used as a seal. The new gasholder, on the other hand, is a reservoir of polygonal cross-section, consisting of bottom, sides, and roof. Between the sides and the roof is a movable dish. The gas enters through the bottom under the dish and forces the latter up and down. An absolute seal between the sides and the movable dish is obtained by a lute filled with coal tar.

The weight of this new system of gasholder is considerably less than that of the old design, in view of the absence of the large quantity of water. This is a consideration particularly important in Holland, where the ground is generally not capable of carrying heavy weights, as it involves a large saving in foundations.

The space which the new gasholder covers is much smaller than that of the customary gasholder; and a further advantage is that the former need not be kept warm during frost.

The new holder at Leerdam was provisionally built to contain 2000 cb. metres of gas, and can be extended to 3500 cb. metres capacity. It was supplied by the N. V. Geveke & Co.'s Technical Bureau, at Amsterdam.

WORKING RESULTS FROM VERTICAL AND INCLINED RETORTS.

The subject of carbonization received much attention at the annual meeting of the New England Association of Gas Engineers; three papers being read, and a general discussion taken.

Mr. W. G. Von Gemmingen, the Superintendent of the Brockton Gas Light Company, said that during 1916 he had to contend with abnormal conditions of coal supply. The shipments in the early part of the year were charged with ice to such an extent that sometimes the charge into the retorts showed a moisture content of 16 p.ct., and the average up to June was over 5 p.ct. Although this wet coal had to be stacked in piles sometimes 45 ft. high, there was not the slightest sign of heating, and parts of it had to be handled so many times that they were reduced to a condition resembling slack. By the summer, the stock comprised eight different kinds; and they could never be sure of just what operation was necessary to secure the best results. When the summer consignments began to arrive, they were mixed with the stock in order to obtain better carbonizing conditions. As the retorts in which lower secondary air was installed gave less trouble, they decided to extend this improvement to the whole, and also to have all the retorts lined with silica. In September, they began to operate on the basis of obtaining the greatest yield in heat units per pound of coal, and the larger make of gas lowered the candle power without materially decreasing the calorific value; also there had been no reduction in the yield of residuals per ton of coal.

A table of operating results during the year showed that the make of gas (corrected) ranged from 650,000 to 800,000 c.ft. per day, and from 5·3 to 5·9 c.ft. per pound of coal. The illuminating power by Sugg's "D" burner was about 16 candles during the early part, and 14 candles towards the close of the year. The calorific value of the gas made during the last four months was nearly 600 B.Th.U. per cubic foot, and the ratio of furnace fuel, after crediting the power developed from the waste heat, was frequently under 10 p.ct. The residuals comprised about 150 lbs. of breeze, 1250 lbs. of large coke, and 13 gallons of tar per ton of coal.

The installation at Brockton as above referred to, includes many very interesting details. It comprises continuous vertical retorts of the Woodall-Duckham type, having a nominal capacity of 1,000,000 c.ft. per day. Coal can be stored in the open or delivered directly into a track hopper, under which is a carrier conveyor that encircles the retort-house. This can also be supplied with coal when required from the yard storage. The coke plant comprises a large storage bin to accommodate the night's make, as the sizing, screening, and delivering machinery is only worked during the day. Sized coke can be delivered either to the furnace fuel bins or to the carburetted water-gas plant. There is a Babcock and Wilcox tube boiler for recovering waste heat from the retorts, by means of which quite ¾ boiler horse power is obtained per ton of coal carbonized. The waste gases are drawn through by induced draught fan, and discharged into a circular chimney, 120 ft. high and 3 ft. internal diameter. The retort-house contains one bench comprising four beds of four rectangular section retorts, each 25 ft. long, tapering from 20 in. by 5 ft. 3in. at the bottom to 8 in. by 4 ft. 9 in. at the top. There is a separate seal box, valve, tar take-off, and overflow, with cleaning pockets, to each bed, and the gas passes through a retort-house governor to a 16-in. collecting main. Power is provided by an electric motor with a steam-engine as a stand-by; and the total power required does not exceed ½ H P. per bed.

That the past twelve months had presented unusual conditions, as the cost of raw material had rarely attained to such high figures, was the remark with which Mr. Francis W. Drake, the Manager of the Gas

Department, Lynn Gas and Electric Company, introduced some details of results obtained from West Virginia and Pennsylvania coals, including three standard varieties that had been used for many years, and two snap lots, not under special test conditions, but as part of the standard routine.

The retort-house contained ten beds, divided into two benches of five each, of which eight had been renewed within the last three years, and the parts above the combustion chambers constructed in silica. Each bed contained nine inclined retorts, 18 ft. long, 16 in. by 25 in. in cross section. The make of gas per pound ranged from 5·04 to 5·39 c.ft., the calorific value from 573 to 626 B.Th.U., the yield per retort 18,460 to 21,970 c.ft., the charges were 900 to 1000 lbs., and the working temperatures in the retorts about 2100° Fahr. The production of coke was 70·7 to 74·5 p.ct., and breeze 34 to 65 lbs. per ton. The coals averaged 36 p.ct. of volatile matter, 56 p.ct. of fixed carbon, 7 p.ct. of ash, and 1·2 p.ct. of sulphur; and the coke, 3 p.ct. of volatile matter, 86 p.ct. of fixed carbon, 11 p.ct. of ash, and 0·4 to 4·1 p.ct. of sulphur. The heating value of the coals varied from 13,164 to 14,708 B.Th.U.; and the coke 12,320 to 12,994 B.Th.U. per pound. The respective qualities of the coke were: No. 1, hard close texture, clinkers close to fire-bars, good for water gas; No. 2, hard good texture, hard flinty clinker high in furnace, necessitating frequent barring down, good for water gas; No. 3, hard flinty close texture, tough glazed clinker close to bars, poor for water gas; No. 4, medium hard close texture, medium hard clinker high in furnace, requiring frequent barring down; No. 5, soft friable texture, no clinker in furnace and little fine ash, fair but not sufficient body for water gas.

The third paper comprised a description of a bench of inclined chamber retorts by Mr. A. K. Quinn, the General Manager of the Newport (R.I.) Gas Light Company. Some particulars of these retorts have already been given in the "Journal" [*ante*, p. 56].

Coke-Oven Bye-Products in the United States.

The "Iron Trade Review" [quoted by "Engineering"] notes with satisfaction that the United States iron and steel industry has been vigorously carrying forward of recent years the construction of coke plants of the bye-product recovery type. It is estimated that the country is to-day producing pure or refined benzol at the annual rate of 30 million gallons; pure toluol from 6 to 8 million gallons; and phenol from 25 to 30 million pounds. In the Midsummer of 1914 the American annual production of pure benzol was at the rate of 3,000,000 gallons; of toluol 750,000 gallons; and of phenol 120,000 lbs. In 1916, the country produced about 325,000 tons of sulphate of ammonia equivalent, compared with 183,000 tons in 1914. After the war much of the coal-tar products now going in some form to European battle-fields will be diverted to peaceful purposes. Furthermore, adds our contemporary, the American manufacturing efficiency will have been greatly promoted by the advantages which the bye-product method of coke making possesses over the bee-hive process.

Effect of Temperature of Carbonization on Light Oils.

An investigation into the effect of temperature and duration of reaction on the formation of light oils in coal carbonization at atmospheric pressure, by Messrs. M. C. Whitaker and W. R. Crowell is described by them in the "American Journal of Industrial and Engineering Chemistry." By light oils, the authors mean those distilling from the tar at temperatures below 210° C. They state that the results confirm those of other investigations in regard to the effect of temperature on the formation of the total, light, and heavy oil, and of the tar acids in the light oil. Low temperatures favour the formation of the total, light, and heavy oil, and tar acids. Increasing temperature causes a falling-off in the percentage yields of light oil and tar acids, and an increase in the percentage yields of heavy oil. The low-temperature oils are characterized by high content of paraffins and unsaturated bodies and low content of aromatics. Increased temperature causes the percentage yields of paraffins to decrease, and that of the aromatics to increase. The results as a whole emphasize the necessity of temperature control in coal carbonization, if the yields of the important aromatics are to be considered. Under the conditions usually maintained in standard practice, it is evident that, for actual efficient combined yields of benzene, toluene, and xylene, the carbonizing temperatures should not greatly exceed 800° C., nor should they lie much lower than 700° C. The fact that such good yields of the aromatics are obtained at gas and coke works where very high temperatures are employed, is, no doubt, due to the protection offered by the cooler central core of coal which does not reach the cracking temperatures, and to the cooling effect on the hotter gases due to dilution with the cooler gases emerging from the centre of the charge. By the use of any device whereby the duration of the carbonizing reactions is shortened, it seems possible both to increase the yields of the paraffin oils at the lower temperatures and the yields of the aromatics at the higher temperatures. It is also possible to operate at higher carbonizing temperatures.

Suggested Tax on Municipally Owned Undertakings.—The California State Board of Equalization, in their recent biennial report, proposed the making of provision for taxing municipally owned public utilities. They called attention to the loss of revenue to the State occasioned by the exemption of municipally owned public utilities and said: "There seems to be no reason in equity why the municipally owned utility should not bear its just proportion of a State tax."

GAS PURIFICATION OXIDES.

In a paper read by Mr. A. H. Scott, of the People's Gaslight Company, Manchester (N.H.), before the annual meeting of the New England Association of Gas Engineers, the sources and methods of production of some of the better known forms of gas purification oxides, which may either be natural or manufactured, and their sulphur absorbtion properties, were fully considered and described.

The bog ores are a widely distributed form of hematite formed by sedimentary deposits, prepared for use by drying, screening, and grinding to fine powder. Their value is to some extent influenced by the physical condition. They are mixed with manufactured oxides with good results; many of them are used because the scarcity of oxide renders buyers less particular as to quality; and they have the advantage of easy mixing and comparative safety from overheating.

The manufactured or precipitated oxides are to a large extent the bye-products of metal extracted from the ores. The mineral bauxite, found in all parts of the world, which is the chief source of metallic aluminium and its compounds, furnishes a considerable portion, as a residue after the extraction of the alumina. European methods are more efficient than American, and leave less than 6 p.ct. of alumina in the residue. In the United States, as much as 11 p.ct. may be retained; and anything approaching this proportion impairs the purification value. American bauxites are also prejudiced by the presence of silica in considerable quantity. A high-quality oxide is produced as a bye-product in the reduction of aniline, and, if the dye makers retain their business after the war, should be a valuable source of purifying material, and a profitable residual.

Waste water from the West Pennsylvanian coal mines was yielding a very efficient natural oxide. Called upon to abate the nuisance caused by running it into the rivers, the owners collected it in large settling basins for treatment; and the sediment thus obtained had been found to be an excellent purification material. Metallic paint oxide showed results fairly comparable with good manufactured oxide, and would come into more general use. Finely ground pyritic cinder had met with favour as yielding good working, although somewhat crystalline and vitreous in structure. Many of these newer forms of oxide would be much improved for the purpose by experience, as manufacturers and gas-works chemists were feeling their way towards a material that would take up several times its own weight of sulphur, and not be liable to cake and cause back-pressure in the purifiers.

In absorption tests conducted on a number of oxides under similar circumstances (four foulings to each test), the percentage of sulphur taken up was as follows:

Residue from aniline reduction	62
Sediment from mine water	61
Pennsylvania bog ore	61
Ground pyritic cinder	53
Hematite ore	49
Hydrated iron ore	46
Residue from American bauxite	35
" " French "	42
" " English "	15
Cuban bog ore	31
Metallic paint	49

Sulphate of Ammonia Supply in Japan.—According to the report of the United States Consul-General in Yokohama, supplies of sulphate of ammonia in Japan are "becoming increasingly short." The great bulk of the shipments come from Great Britain, but have of late "greatly decreased." Of last year's total exports from England, shipments to Japan amounted to 9155 tons—a decrease of 1382 tons compared with the preceding year. Sulphate of ammonia is produced in Japan, but the output is insignificant—not more than 3000 tons a year; while last year's consumption in the Kobe and Osaka districts alone amounted to about 7000 tons.

The German Welsbach Company's "Nest-Egg" to be Dealt with.—According to the "Berliner Tageblatt" [noticed by the "Ironmonger" for the 7th inst.], the German Incandescent Gaslight Company—known as the "Auer Company"—has flourished exceedingly, and has accumulated enormous reserves during the last few years. At the annual general meetings, shareholders have repeatedly, but fruitlessly, endeavoured to secure a part of this wealth in the shape of increased dividends or in some other form. Now, however, the Directors have at last decided to distribute a part of the accumulation in the following complicated manner: One in every five of the original shares is to be converted into an original share known as "Series C." On each of these shares (of a face-value of 1000 marks) a bonus of 5900 marks is to be paid in cash from the reserve funds, which amount to about 17,800,000 marks. For the next ten years the original shareholders will be guaranteed a dividend of 5 p.ct. yearly on the "Series C" shares as well as on the unconverted original shares; but the unconverted shares alone will be guaranteed a further dividend up to 20 p.ct. If the dividend in any one year should exceed 25 p.ct., the unconverted and the "Series C" shares will participate equally in the surplus distribution; but the Directors have made it known that they consider it contrary to the interests of the Company to pay more than 25 p.ct. dividend. This transaction will absorb only part of the reserves of the Company—namely, the special reserve set aside for redeeming the preference shares, and the balance carried forward from last year. Considerable "interior" reserves still remain intact.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Adulteration v. Dilution.

Sir,—The gas industry is indebted to Mr. Herring for his able letter, and particularly for drawing attention to the probability of restrictions being imposed if the reprehensible practices to which allusion is made, are not discontinued.

It may facilitate the discontinuance if it can be shown, as I believe it can, that the use of simple expedients for inflating the gaseous volume does not pay.

I have recently extracted from the last published accounts the cost per 1000 c.ft. of gas into the holders at several works where adulteration and dilution are respectively practised; and the figures show that the cost is from 2d. to 3d. per 1000 c.ft. more where unduly inflated makes are claimed, as compared with works where dilution with blue water gas is the method that is adopted for effecting economies in the use of fuel.

Good makes per ton when obtained by legitimate means should bring credit to the management and staff of foremen and workmen; but at the present time the figures are often misleading, and constitute no reliable indication of really good management.

What has been said has no reference to the large makes claimed under level-gauge conditions with some installations of vertical settings. It should be remembered, however, that the yield of gas per ton of coal is often helped in these cases by the admission of a small but continuous stream of steam into the coke chamber—serving the double purpose of cooling the coke prior to discharge, and materially helping to improve the make per ton, by ultimately splitting-up into its gaseous elements and by reaction with the incandescent coke.

Thos. Glover.

British Gas Light Company, Norwich, April 13, 1917.

Sir,—I do not suppose that anyone ever dreamt that coal gas ("honest coal gas" as Mr. Thomas Glover styles it) would stand the fleeting of its "cream" to anything like the extent now done, with so little impoverishment of the "milk" left. It is astonishing how far the heating value can be preserved, and so finely regulated, with even great differences in composition of bulk volumes.

Whatever may be claimed for coal gas, pure and simple, or of mixtures with it, aiming at a certain calorific value, the best could surely be obtained from, first, the highest hydrocarbon contents for stripping, and, secondly, the absence, as far as possible, of inert gas.

This takes one back to the results obtained at Exeter by the Settle-Padfield process, where, taking the late Professor Lewes's figures in two tests, the hydrocarbon content was maintained at (1) 57·3 p.ct. and (2) 63·1 p ct. with an average volume of 13,250 c.ft. per ton of 14·75 candles with the No. 1 burner (17·2 candles with the No. 2), and a net calorific value of 533·7 B.Th.U. The process in continuous working, as many published records show, gave an average of 50 to 55 p.ct. of hydrocarbon content in the total volume (28 to 35 p.ct. was the range before that).

As a result of the war, and the very large contribution coal gas has made in producing the chief basis for the manufacture of high explosives, it appears—perhaps a little late—there was something very much right with the Exeter system of carbonizing coal in vertical retorts.

It is of national importance, and essentially necessary, to split-up every ton of coal produced and used in Great Britain into such proportionate parts that the whole will yield the very highest amount of heat-units. The lighting power of the gas needs no consideration whatever, as any intensity of light which may be desired can be obtained by adjustment of thermal value to pressure.

I have been trying to fit other gas in with coal gas to secure higher calorific values; but I find the best result comes by avoiding the presence of too much inert gases.

It is to be hoped every effort will be directed to the sides of the question you have been advocating in your editorial columns—all being worthy of the best consideration.

T. Settle.

Leeds, April 12, 1917.

Comparisons at Burnley.

Sir,—My attention has been drawn to the report, under the above heading, in your issue of the 27th ult., of a speech made by my Chairman. Alderman Emmott did not say that "Burnley was making gas as cheaply as Sheffield and Widnes." In other respects, also, your report gives a wrong impression of his argument, which being unprepared was perhaps not expressed very clearly, and was therefore misunderstood by your reporter.

Jno. P. Leather, Gas Engineer.

Burnley Gas-Works, April 11, 1917.

Gas Company and Electricity at New Ross.—Mr. H. Kirkham, the Secretary and Manager of the New Ross Gas Company, recently wrote to the local District Council stating that, suggestions having been made as to the feasibility of the Company undertaking the supply of electricity for lighting, &c., in addition to that of gas, his Directors had had the matter under consideration. They had come to the conclusion that, being in possession of suitable premises for the installation of the necessary plant, they were in a position to supply electricity with a reasonable prospect of success. In order to enable them to proceed with the project, he was instructed to ask if the Council would facilitate matters by giving permission for the erection of pillars and brackets to carry the overhead wiring. The Council agreed that the facilities asked for should be given.

REGISTER OF PATENTS.

Producing Sulphate of Ammonia.—No. 104,155.

Riter-Conley Manufacturing Company, of Leetsdale, Assignees of H. A. Carpenter, of Sewickley, Penn., U.S.A.

No. 4000; March 17, 1916. Convention date, Feb. 15, 1916.

This invention relates to the production of sulphate of ammonia by subjecting coal gas to a sulphuric acid saturation bath; the chief object being to cause the reaction to proceed under conditions most favourable for the production of high-grade, acid-free sulphate by keeping the bath of uniform temperature, volume, and acidity, and effectually washing the acid from the salt during its removal from the bath.

The treated gas leaving the acid saturation bath is maintained at a predetermined uniform temperature by utilizing its temperature to control the temperature of the incoming gas, and so ensuring vaporization of water from the bath in any desired amount.

The volume and acidity of the bath are kept uniform by utilizing conditions inherent in the bath to automatically control it through the intervention of devices described by the aid of sheets of lettered drawings.

The salt is freed of acid by displacing and subjecting it to a current of water moving in an opposite direction; and this same current of water may be utilized for replenishing the water content of the bath.

To insure complete dissemination of the acid content throughout the saturation bath, it is maintained in two bodies with means for securing constant circulation between them. The reaction takes place in one of the bodies, and the acid replenishment is accomplished in the other body; so that thorough and uniform mixture is maintained, particularly in the portion of the bath where the reaction takes place.

The arrangement is not further described apart from the drawings and the fifteen "claims" for the invention accompanying the specification.

Gas Heating Burners.—No. 104,573.

Harper, F. D., of Workington.

No. 5096; April 6, 1916.

This invention relates to gas-burners having a tubular body with a tapering delivery end, and in which the air regulator is a cap screwed on the threaded portion of the gas inlet tube and faced on its inner side to fit closely against a corresponding facing on the rear of the burner; and so serving as a shield to prevent back-firing.

The burner body (which forms the mixing-tube) is of an ordnance shell configuration, and fits the gas inlet pipe in the rear. The air inlet (also in the rear) is controlled by an iron cap revolving on the gas inlet pipe; so that, by turning the cap the supply of air to the mixing tube is regulated. But by the use of a reducing coupling screwed on to the gas inlet pipe a gas-nozzle of any required size may be fitted.

Pot Furnaces for Melting Metals.—No. 104,583.

Gibbons Bros., Ltd., and Masters, R., of Dibdale, Lower Gornal.

No. 6176; May 1, 1916.

It has previously been proposed, the patentees point out, to so arrange a metal melting pot furnace structure that the air to support combustion in it is preheated by passing through flues adjacent to, and heated by, the waste-gas flues from the pot furnace.

The present invention comprises a brickwork furnace structure for two or more pots in which, in one arrangement, there are built alternate up-cast waste-heat flues and down-cast hot-air flues separated by thin brick walls, the upper ends opening to the atmosphere and the lower ends of the hot-air flues opening into closed ash-pits under the fire-bars of the furnaces; so that when the furnaces are at work the incoming air passing down the hot-air flues to the furnaces is heated by the waste-heat rising up the flues.

In another arrangement the waste-heat flues built in the pot furnace are made as down-cast flues and in combination with down-cast hot-air flues between the pot chambers and the waste-heat flues—the down-cast hot-air flues being open at the top for the admission of air and open at the bottom for the hot air to pass to the closed ash-pits under the fire-bars.

Economizing Devices for Cooking Stoves and Burners.—No. 104,665.

Pickard, C. E., of Northcote, Victoria, Australia.

No. 319; Jan. 6, 1917.

This is a stove attachment to enable hot gases from a burner or group of burners to be applied in the first instance to the heating of a vessel immediately above it, and then to be conveyed where they may be again used, "so that more than one cooking vessel may be heated simultaneously."

The attachment is such that the support for the primary vessel is at a lower level than the support for the additional vessels—a rising passage way or flue to each higher support being provided; and the primary vessel support is not such as will allow the heated gases which burn under it to escape up the sides. The support is dished, and the dishing "allows of exposure of a large area of bottom of the primary vessel to the burner heat, and allows of vessels of different sized bottoms being seated on the support satisfactorily."

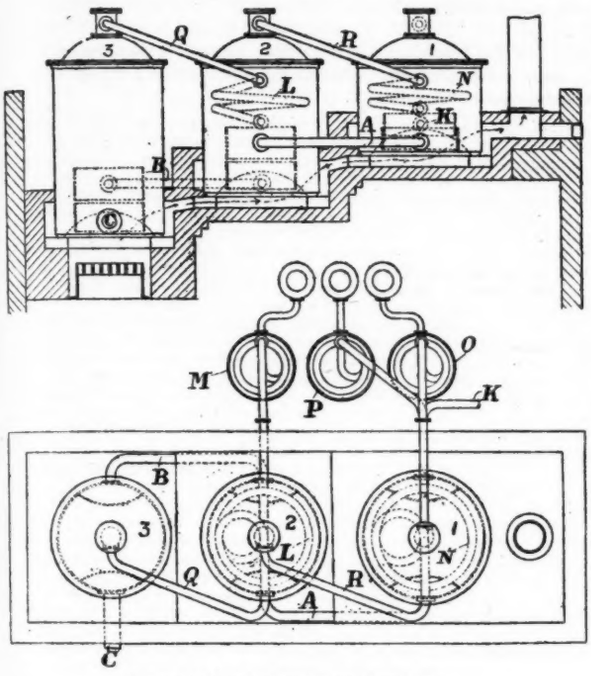
Continuous Stills for Coal Tar.—No. 104,636.

Moore, H., and Day, C., of Hazel Grove, near Stockport.

No. 12,188; Aug. 29, 1916.

This invention relates to a series of stills arranged at different levels; while the furnace gases pass in a direction opposite to that of the product to be distilled, the distillate is used to heat the product and is passed through coolers.

A side elevation and plan of the plant are given.



Moore and Day's Continuous Tar-Stills.

Three vertical tar stills, 1, 2, 3, with concave bases and domed at the upper end, are employed. They are placed at such levels that the heat is applied directly around the base of No. 3, and passes thence under Nos. 2 and 1. The tar enters No. 1 by the pipe K; then through the pipe A, then through still No. 2 and flow pipe B into still No. 3, and leaves by the outlet C. Baffles are placed, in a vertical position, near the inlets and outlets of the pipes, so as to make the path of the tar more tortuous. In passing through the stills the tar is thus subjected to increasing temperatures, with the result that portions of varying boiling points are distilled from each. The boiling point of the distillate from No. 1 is lower than that from No. 2; and the products of the highest boiling point are distilled from No. 3. The distillates are cooled in condensers O, P, and M, and then collected in separate receivers. The vapours of the distillate from still No. 3 are passed, by the pipe Q and a coil L, through the body of still No. 2, whereby a portion of the heat is extracted, and goes to heat the tar in still No. 2. The distillate from still No. 3, after passing through the coil L in still No. 2, is further condensed by a water-cooled condenser M, and then collected in the third receiver. Similarly the vapours generated in still No. 2 are passed through the pipe R and a coil N in still No. 1, whereby a portion of the heat is transferred to the tar in still No. 1, and thence the vapours, along with any condensate, pass through the condenser P, and are collected in the second receiver. The vapours distilled from still No. 1 may be condensed by the incoming tar or by a water-cooled condenser O, or by both. They are collected in the first receiver.

The dimensions of the stills are so arranged that the relationship between the area of exposed upper tar service to the capacity of the still is greater in the first still, and decreases in the hotter stills. For example, the height of the body of the first still may be two-thirds of the diameter of its base; the height of the body of the second still equal to the diameter of its base; and the height of the body of the third still one and a half time the diameter of its base. The object of this is to allow for the frothing which may take place in the earlier stages of the distillation.

Prepayment Gas-Meters.—No. 104,724.

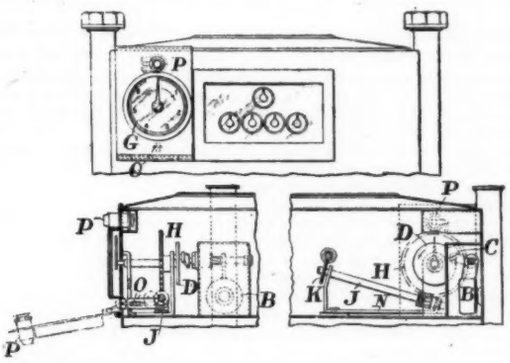
Metropolitan Gas-Meters, Ltd., and Forster, J. D., of Nottingham.

No. 3727; March 13, 1916.

This type of prepayment gas-meter has an arm or tappet arranged in combination with a gas inlet valve adapted to be set back to an extent corresponding with the prepayment made, as described in patent No. 9411 of 1902.

A front view of the attic portion of a meter, also sectional side and rear views are shown.

The gas inlet valve B is closed by the arm or tappet C on the disc D, which is keyed upon a spindle carrying a pointer moving over the dial G, indicating the amount of gas prepaid. H is the measuring wheel actuated by the flow of gas so as to bring back the tappet C gradually to zero and close the inlet valve when the prepaid quantity of gas has been consumed. The wheel is actuated by a worm keyed upon a secondary spindle J having keyed upon it at its other end the worm wheel K gearing with a worm upon the index spindle of the meter mechanism. The spindle J is carried in bearings upon the frame N, approximately in the plane of the index spindle; the free end of the frame being connected by links O to the lower part of the door



Forster's (Metropolitan Gas-Meters, Ltd,) Prepayment Gas-Meter.

which covers the dial, so that when the door is turned down the frame N is moved laterally, and frees the wheel H so that it can be turned by the inspector to reset the mechanism for a further prepaid quantity of gas.

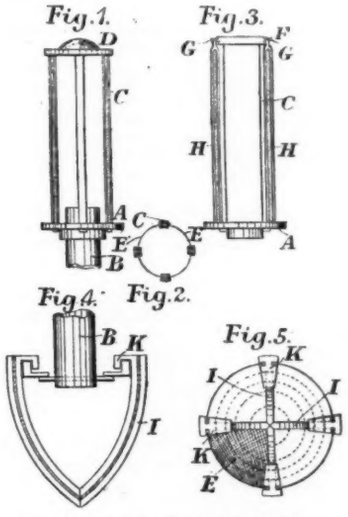
The door is secured (to prevent unauthorized manipulation) by a lock P, which is actuated by an expanding or contracting key of the kind described in patent No. 104,725.

Incandescent Gas-Mantles.—No. 104,744.

De Lassus, F. de H., of Paris.

No. 4058; March 18, 1916.

This incandescent gas-mantle comprises "a plurality of independently removable panels or sections of impregnated fabric which are mounted between the adjacent uprights or depending members of a refractory supporting framework."



De Lassus' Incandescent Mantles.

In figs. 1 and 2, the mantle framework comprises a circular or polygonal base A having a tubular bottom portion or union piece adapted to fit upon the top of an upright gas-burner B. Upon the periphery of, and at right angles to, the base, a number of uprights C are fixed, the upper ends of which pass through, or are attached to, a cap D. The frames thus formed receive panels E of fabric treated with solution of cerium, thorium, &c. These panels (curved or flat) are let into the frames formed by the uprights, so as to "constitute the complete mantle."

In fig. 3, the upper ends of the uprights are held by a ring or cap F having hooks G upon which light frames H are hung. By this arrangement any single damaged panel can be replaced easily.

For inverted burners, as in figs. 4 and 5, the framework is composed of curved members I connected at their lower ends so as to form with side slide grooves (adapted to receive panels of impregnated fabric) a triangular shape. The members I have noses or hooks K which grip the ring of a support of the burner B.

The patentee points out that his mantle, having a plurality of renewable facets or panels, affords considerable economy compared with the present mantles made in one piece, as a partly damaged mantle can be repaired. Moreover, "the physical resistance of the relatively fragile fabric of the mantle is appreciably increased, owing to the fact of its subdivision into independent sections and the provision of a large number of points of support, and also (and more especially in reference to upright burners) owing to the firm fixture of the framework upon the burner." This feature does away with one drawback in ordnary mantles—namely, that the mantle becomes deformed above the frame or detached from its point of suspension.

MISCELLANEOUS NEWS.

GAS CONSUMPTION IN GERMANY.

The latest available statistics, collected by the Central Gas Publicity Bureau of Germany, continue the record of the growth of gas consumption in that country in war conditions down to November last. In the "Journal" for Nov. 28 last (p. 434) the statistics for June and July, 1916, were quoted, and references were given to earlier figures. The comparative figures for August relate to 784 works, which in that month of 1916 produced 2·4 p.ct. more gas than in August, 1915, and 15·6 p.ct. more than in August, 1914. The following are the corresponding figures for the next three months:

September: 783 works compared.
Increase, 1916 over 1915, 2·8 p.ct.; 1916 over 1914, 19·7 p.ct.
October: 741 works compared.
Increase, 1916 over 1915, 7·6 p.ct.; 1916 over 1914, 23·8 p.ct.
November: 739 works compared.
Increase, 1916 over 1915, 7·4 p.ct.; 1916 over 1914, 19·5 p.ct.

In November the number of consumers' meters in use in connection with 516 gas-works was, in 1916, 6·7 p.ct. more than in 1915, and 16·9 p.ct. more than in 1914.

The great increases in production in 1916 as compared with 1914 are, of course, largely a reflection of the considerable falling off in consumption which took place in the later months of the latter year, as reported from time to time in the "Journal" [*vide* Vol. CXXIX., p. 242]. If the comparison had been made with the corresponding months of 1913, only a comparatively small increase would have been shown for 1916.

STRETFORD GAS PROVISIONAL ORDER.

A conference took place at the Stretford Gas-Works last Friday, under the direction of Mr. H. C. Honey, of the Board of Trade, between representatives of the Stretford Gas Company and of the Stretford Urban District Council. The conference had reference to the Provisional Order for which the Company are applying to the Board of Trade, to extend their powers for the manufacture and conversion of residual products arising in the manufacture of gas, and to amend the Act of 1899. The Council had suggested the following amendments (which the Company declined to accept) as a condition of their assent to the application: (1) The manufacture of residuals to be limited to those arising from the manufacture of gas by the Company. (2) The Company to use modern approved appliances, and the process to be free from public nuisance. (3) Effective prevention of the discharge of gaseous or noxious liquids into the district sewers or neighbouring watercourses. It was explained at the recent meeting of the Company that they already had the power to work-up residual products; but this was on land that was covered by gas-works buildings.

Mr. G. C. Adams (Solicitor) opened the proceedings at the conference by stating the Company's case and replying to the objections of the Council.

Mr. G. H. Abrahams (the Clerk to the Council), in reply, confined himself entirely to three matters—the accidental pollution of the sewers and watercourses, the emission of smoke from the retort-house, and the setting-up of what he described as a large chemical industry in a residential district.

The Surveyor, who followed, endeavoured to prove that the pollution was continuous, and not without the Gas Company's knowledge. Allusion was made by both the Council's representatives to promises by the Chairman and other Directors not being carried out by the officials and others.

These were strenuously and indignantly repudiated by the Chairman (Mr. W. A. Nicholls), the Solicitor, and the Engineer and Manager of the Company (Mr. H. Kendrick).

Finally, Mr. Honey decided that the Company ought to agree to the insertion of a clause for the protection of the Council, based on that for Wood Green in the Hornsey Act of 1916. This was thrashed out and agreed to. The clause referred to removes the gas-works from the special protection of the Gas-Works Clauses Act, 1847, and brings them under the ordinary legislation of the Public Health Acts and the special clauses contained in the Stretford Urban District Council Act of 1906.

The Council fought hard to obtain limitations of the residual plant to the Company's own products, alleging all manner of nuisances in a residential neighbourhood, which mainly consists of cottages of 7s. to 8s. per week rental. The Company put in a list of works in Trafford Park near by, giving off fumes and bad effluent, and an estimate showing what residuals plant was proposed. The Company tried unsuccessfully to induce the Council to withdraw their opposition, urging the national interest, the commercial probabilities, and the possibility of a reduction in the price of gas from the increased profits by keeping the plant fully employed; but the Council was adamant.

Mr. Honey then stated that the Board of Trade would decide what to do, and would probably insert the Model Clause limiting purchases to one-third the make. Finally, the Council, on this undertaking, and the special clause, agreed to withdraw the opposition.

With regard to the estimate of expenses of the proposed new works, referred to above, it may be said that the work now in hand consists of: Alteration to scrubber for oil-washing, including pipes and connections, £266. Debenzolizing stills and oil storage tanks, complete with buildings, foundations, and connections, £1517—total, £1783. The following work will be proceeded with later: Benzol refining plant, complete with tanks, buildings, foundations, and connections, £922. Tar dehydrating plant, complete with tanks, foundations, and connections, £834. Sulphate and concentrated ammonia plant, complete with buildings, stores, tanks, foundations, and connections, £4200—total, £5956.

GAS TROUBLES AT IRISH TOWNS.

Standard Price or Maximum Price at Tipperary.

An inquiry has been held at Tipperary by Mr. P. C. Cowan (an Irish Local Government Board Engineering Inspector), into the local Gas Company's application to the Board of Trade to have the price of gas fixed by Parliament five years ago revised, and to have a standard price, with a sliding-scale, substituted for the fixed maximum price of 4s. 6d. per 1000 c.ft. The Urban District Council opposed the application, on the grounds that they would not have a standard price at any cost, and that the circumstances did not warrant a change in the maximum fixed by Parliament.

Mr. *G. W. Anderson*, a Director of the Company, said they wanted the revision not so much because of the conditions arising out of the war as because of the conditions with the permanently increased cost of working after the war. He held that the substitution of a sliding-scale would be much more satisfactory to consumers and shareholders alike. With a sliding-scale, the Company would have every inducement to sell gas at the lowest possible price; whereas with the maximum price fixed, they were debarred from charging a higher price when an increase was necessary owing to a reduction of profit. The Company found it impossible to get new capital. Even their own shareholders thought the concern a "bad egg," and would not touch it any further. Gas was being sold in Tipperary cheaper than in Bray, notwithstanding the heavy extra cost of the carriage of coal to the former place; and in Limerick, where the Corporation had no capital to provide for, they were afraid that this year they would not be able to pay their way at 5s. per 1000 c.ft. There had been gas in Tipperary since 1852. His family were connected with the works since 1876, when the price was 7s. 6d. or 8s. per 1000 c.ft. Nine years ago, they lost a large consumer in the military barracks.

Mr. Frewen (for the Council) said there was hope of getting the gas back to the barracks if the price were reduced.

Witness stated that all the work in connection with the accounts was done in London, and had been for thirty years. One of the grounds upon which the Company had looked for additional capital was that they wanted to bring mains out to Limerick Junction—an important centre on the Great Southern and Western Railway.

Mr. *D. Kelly* (the Chairman of the Urban Council) said the general feeling in the town was that there should be no departure from the fixed maximum price of 4s. 6d., which was considered a fair price. The Council had maintained all along that the capital of the Company was too high; and with the ruinous example of Fermoy before them, they could not agree to a standard price.

The Inspector asked whether it was fair to throw all the loss on the Company. Why should not the town share it?

Witness replied that it would not be fair to ask the town to bear any loss. For many years the Gas Company obtained good profits.

The Inspector suggested that the concern might possibly be sold to the Council.

Mr. *Anderson* said they could not buy. And, even if they could, the Company were not sellers.

Mr. *T. Dawson* (the Town Clerk) intimated that Mr. T. Lyne, the Manager of the Wexford Gas-Works, who was prevented by illness from being present, had stated that he considered the clause enabling the Company to look for a revision of the price a great hardship on the consumers. He was convinced the maximum price fixed by Parliament was sufficient.

The Inspector: It is a most extraordinary thing on the part of the Urban Council to seek to bind the Company down to the old rate. Surely you would not object to revise the matter from time to time if the circumstances rendered it necessary?

Mr. *Dawson*: If the Company are losing temporarily, during the war, that is no reason for giving them a permanent increase? Considering the profits they made in the good years before the war, they should be able to tide-over the present time.

Mr. *Anderson* said the reason of the opposition in Tipperary was that they wanted to ruin the Gas Company and then buy the works up cheap.

Mr. Frewen said the Council did not want the works. The Company had offered to sell them before, and the Council refused to buy. The Company put the ratepayers to £1500 costs in fighting them.

The Inspector expressed a hope that the Council and the Company would come to some agreement. Meantime, the Local Government Board would forward the report of his inquiry to the Board of Trade in London.

An Inquiry at Lisburn.

Mr. Cowan has also held an inquiry into the Lisburn Urban Council's application for a Provisional Order to alter and amend a section in the Local Act to enable them to raise the limit of the price of gas to consumers from 4s. to 6s. 6d. per 1000 c.ft. The witnesses examined were Messrs. A. S. Brook (Gas Manager) and T. M. Wilson (Town Clerk); and there was no opposition on the part of the ratepayers.

It was explained in evidence that, unless the present price of 4s. per 1000 c.ft. were increased, there would be a loss of £2000 per annum on the working of the undertaking. This year there was a deficiency of £1800; and the town rate for the coming year was to be 9s. 3d. in the pound. It was felt that to call upon the ratepayers to make up the deficiency would be a great hardship, especially in the case of those who were not consumers; while others outside the boundary would have to be exempt. It was suggested that 6s. 6d. would be a proper sum to ask as a limit, and that 5s. 4d. would be a fair price to charge consumers. Last year the sales amounted to 43,739,400 c.ft., which was 10·76 p.ct. less than in the previous year. The Council paid £34,000 for the works, obtaining possession on Jan. 1, 1911; and for the first two-and-a-half years the total loss was £3683.

The Inspector said his report would be presented in due course.

CURTAILMENT OF GAS SUPPLY IN HOLLAND.

As has already been stated in the "Journal," the gas industry in Holland is suffering from a coal crisis. Circumstances had rendered it necessary to exercise economy in the use of coal; and when the Government issued general rules to secure this end, the gas and electrical industries were the first to feel the restriction. During February, a further curtailment of the use of coal became essential; and the Government ordered that all private industries should reduce their coal consumption to 75 p.ct. of what it was in the corresponding month of the previous year. The gas and electrical industries, however, had to keep down to 65 p.ct.

Naturally, the terms of this order much disturbed the Dutch gas industry; it being felt that all should have, at least, been treated alike in the matter of restriction. Steps were therefore taken by the Coal Committee of the Dutch Gas Association to get the grievance removed. In a note to the Government Coal Distribution Board, the Committee point out that on a previous occasion the Board expressed the opinion that a curtailment of the gas supply was not in the interest of the country; and, regarded from this standpoint, the restrictions on the coal supply to gas and electrical works should be less severe than in the case of other industries. The Committee also emphasize the fact that less coal carbonized means a smaller production of bye-products. A reduction of 35 p.ct. in the quantity of coal used for gas making in all Dutch gas-works would result in a drop of 262,500 metric tons of coke and 5250 tons of sulphate of ammonia, which is so badly needed for agriculture. They also remark that, in total calorific effect, one wagon of gas coal is equal to two wagons of other industrial coals. The distribution of calorific energy might therefore be arranged in such a manner that all coals suitable for the purpose should be used for the production of gas; the resultant coke being at the disposal of industrial and private consumers.

An interview between the Committee and the Board has taken place, but without any result; the Board maintaining their opinion that the total necessary economy in the use of gas could be secured in connection with the proportion consumed for illuminating purposes.

Dawlish Lighting Contract.—A difference has arisen between the Dawlish Urban District Council and the Gas Company with reference to the amount to be paid under the contract for last year's public lighting. The Company had offered to accept 35 p.ct. of the original contract price for all lamps during the period in which they were not lighted—the hire of lanterns and controllers to be paid in full, and the cost of the gas consumed in lamps at present on bye-passes to be calculated and paid for. The Council are unwilling to pay more than 35 p.ct. of the contract, and contend that this should include the cost of the gas actually used. The matter has been discussed at two or three meetings; and it still remains in abeyance.

COAL GAS FOR ROAD VEHICLES.

QUESTION OF ENRICHMENT.

[From the "Commercial Motor," April 12]

The prospects for the successful application of coal gas as a fuel for internal combustion engines in commercial motor vehicles will not be as good as they deserve in the absence of sustained effort to make the necessary adaptations. Everything at the moment is in some senses against the prospects of the extended use of coal gas as a propulsive agent; while in other senses everything should be in its favour. We class with the adverse factors: (*a*) The difficulty of obtaining a priority certificate for either boiler plates or complete steel vessels; (*b*) lower power from any internal combustion engine when using the present day attenuated coal gas, as compared with power on petrol, the loss being from 15 to 20 p.ct.; (*c*) low mileage on the contents of any flexible container holding gas at atmospheric pressure; (*d*) considerable weight of any rigid storage installation and connections.

The current factors in favour of persistent attention for the claims of coal gas include the following: (*a*) Saving on cost of fuel compared with petrol [a mean of 300 c.ft. of coal gas is equal to 1 gallon of petrol]; (*b*) comparative crudeness of attempts to date to adopt coal gas as a fuel for use in road vehicles, and the potential scope for both detail and general improvements; (*c*) readiness with which coal gas can be enriched by allowing it to bubble through petrol, solvent naphtha, solar oil, or other hydrocarbon, before it reaches the induction pipe of the engine; (*d*) convenience with which any storage vessels can be refilled on the road from a steel bottle of gas [here, of course, the higher cost of gas when compressed to a large number of atmospheres has to be admitted].

We are aware of reports from business users as to their feelings of disappointment about the poor quality of coal gas in certain parts of the country. We must confess, ourselves, that we are equally disappointed to hear that they have not persevered even to the point of trying to enrich the gas, which course is an obvious and simple one.

We put forward the claims and benefits of enrichment, for the attention of friends in the industry, both manufacturers of vehicles and users; and it has afforded the writer pleasure personally to communicate the idea to the expert investigators of the Gas Light and Coke Company. It is clear that, adopting a "pot type" of reducing valve, such as was illustrated in our issue of March 29 (p. 100), the same vessel lends itself to combination as a regulator of pressure and an enriching chamber, although it is probably expedient to allow the gas to bubble through the enriching liquid at a point in the series where it is not in communication with the storage vessel. Seeing that in gas-making practice coal gas is enriched merely by passing it over shallow trays which contain the enriching liquid, the action of bubbling through a small column of such liquid before entering the engine on any vehicle must bring about the desired results, and might conceiv-

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ably raise the calorific value of some of the poor coal gas which is now being sold in the country by as much as 25 p.ct. This improvement should make all the difference between mediocre and outstanding success. Pressure behind the coal gas is not a condition precedent to enrichment in course of use in a motor vehicle. Suction from the engine, applied above the surface of the liquid, will draw the gas through a column of sufficient depth.

The reducing valve alluded to in the above article [for full particulars of which readers are referred to the issue of the "Commercial Motor" there named] is employed on the Neath Tramways, where coal gas has been used for more than eighteen years. "It follows from this fact," says our contemporary, "that the design of the apparatus was evolved, by means of frequent improvement based on the results of experience, from some less efficient type, though perhaps simpler. It will certainly be more economical to copy a proved and existing design than to commence experimenting again *ab initio*. The principle involved in the construction of this valve is merely that a leather diaphragm, which, inflating on pressure above the desired amount and deflating when the pressure is not reached, closes or opens, respectively, a valve in the gas supply-pipe.

Gas Buses in Grimsby.

In connection with this matter of the use of coal gas for road vehicles, Mr. John Terrace, the Engineer and Manager to the Great Grimsby Gas Company, draws attention to a photograph and description in the "Grimsby News" of one of the local Tramway Company's buses which is running on town gas. It has, he says, proved so successful that the Company are arranging for two further buses to be equipped in a similar manner. Some nine months ago, Mr. White, jun. (of the Tramways Company), experimented with compressed coal gas, and later with similar gas at ordinary pressure. In the bus now running, the ordinary petrol engines are used. The carburettor is slightly altered; but without any further adaptation, the gas is drawn into the cylinders. The gas is carried in a storage bag fitted on the top of the vehicle.

Coal Gas for Bath Buses.

Mr. J. Wesley Whimster, the Engineer and Manager of the Bath Gaslight and Coke Company, writes that the Bath Tramway Company are running one of their buses on coal gas; and it is so successful that they intend running several more. The bus is fitted with a gas-bag on the roof; the gas being supplied at ordinary pressure. The petrol engine previously fitted to the bus is being used.

Under the Trading with the Enemy Act, 1916, an order has been made by the Board of Trade requiring the winding-up of the Ramsay Gas Flashometer Company, Ltd., of No. 11, Long Acre, W.C. The Controller is Mr. T. D. Hawkin, Whitehall House, Charing Cross.

STOCKPORT CORPORATION GAS DEPARTMENT.

The minutes of the Stockport Gas Committee confirmed at the last monthly meeting of the Town Council indicate that the Engineer (Mr. S. Meunier) reported that the new ammoniacal liquor concentration plant at the Portwood Gas-Works was started on March 1, and was now practically in full work; the material turned out being equal to the standard prescribed by the Ministry of Munitions in their agreement with the Gas Department. At a subsequent meeting, he reported that, in conformity with the wishes of the Ministry of Munitions, inquiries had been made of various gas undertakings regarding the purchase of their liquor. Terms had been arranged with the Altrincham Gas Company, subject to confirmation by the Directors and the Gas Committee, and further negotiations were proceeding with other gas undertakings.

An increase in the price of gas-stoves, &c., is foreshadowed, as the result of a deputation of manufacturers to the Gas Committee with a request that they should be granted such an increase, owing to the advance in raw materials.

It was reported that the Works' Sub-Committee had now considered the advisability of putting down a tar-distilling plant [see "Journal" for Feb. 23, p. 308], and that they had decided upon the continuous type. The Engineer submitted particulars of the cost and probable revenue; and it was resolved to call a special meeting to deal with the question.

AUSTRALIA AND TOLUENE RECOVERY.

The Minister for Defence of Victoria (Senator Pearce) has intimated that, as a result of the apparent impossibility of getting supplies of pure toluene from commercial sources, the Government have decided to instal their own plant for the purpose. Referring to a suggestion that the Metropolitan Gas Company of Melbourne were prepared to supply the Defence Department with 100,000 gallons of toluene per annum, Senator Pearce said the Company certainly did state that 100,000 gallons of toluene would be recovered if their gas were washed for the purpose of toluene recovery. The Company, however, gave many reasons why this was impracticable, including: (1) Special legislation to allow for a poorer quality of gas for both heating and lighting. (2) Difficulty of operation on account of the Company having three separate works in which they would have to instal plant. (3) Limited area available for the erection of additional plant. (4) Difficulty caused by naphthalene accumulating and causing stoppages in the pipes, on account of the removal of the naphthalene solvents, which include toluene. (5) Difficulty in obtaining the plant for washing the gas. (6) The necessity for erecting expensive refrigerating plant. (7) Inconvenience to the Company caused by the stoppage of works while the

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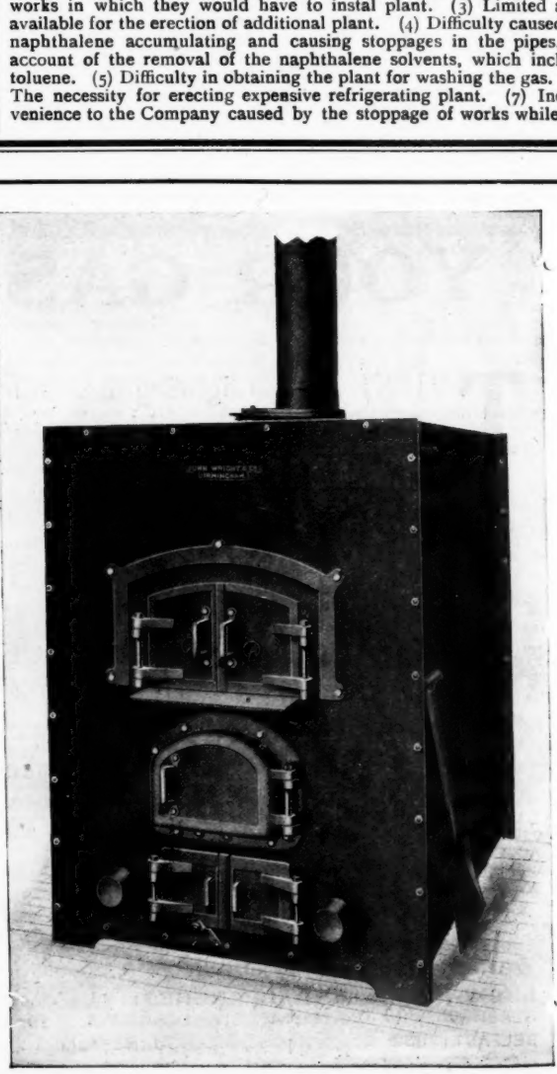

installation of washing plant was in course of erection. The Company's letter, he added, concluded with the following: "Taking all the circumstances into consideration, the Board have reluctantly come to the conclusion that, for the reasons now advanced, the immediate putting into operation on a large scale of any process for extracting toluene from the gas the Company manufacture is impossible; and its ultimate adoption appears to be surrounded with difficulties which render it almost impracticable." In order to secure the necessary raw material for the Government plant, all persons engaged in the treatment of light oils will be licensed, and encouraged, to produce 50/90 benzol for disposal to the Defence Department. As to toluene production by private enterprise, it seems that in only one instance—that of the Australian Gas Light Company of Sydney—is the installation of a plant contemplated.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *April* 16.

The London tar products market remains in the same quiet condition. For pitch, it is reported that 32s. 6d. net per ton at maker's works was recently paid. Considerable quantities are being shipped from London. Carbolic acid 60's, benzene, and toluene are still controlled by the authorities at unaltered prices. Creosote is going steadily into consumption, and there are no stocks worth mentioning. For any available lots about 4½d. net per gallon in bulk at maker's works is still obtainable. Solvent naphtha is unchanged in value.

The prohibition of exports of sulphate of ammonia has not yet been raised. The great rush for deliveries for home agriculture appears to be nearly satisfied, although a few belated orders are still coming forward daily.

Tar Products in the Provinces.

April 16.

Markets for tar products remain the same, and prices are unaltered.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. 3d. to 24s. 3d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s., Liverpool 16s. 6d. to 17s., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is rather more settled, and, with steamers arriving a little more freely at the coal ports, there is now a rather fuller shipment. In the steam coal trade, there is a better demand, and prices seem firmer. Best Northumbrian steams are 30s. per ton f.o.b.; for second-class steams, the current quotation is from about 21s. to 22s. 6d.; and steam smalls are quiet at from 17s. to 19s. 6d. Work at the collieries is a little better than it was; but idle days still continue in some of the steam coal districts, and the high rates of freight keep back transactions to some of the neutral countries. In the gas coal trade, demand is brisk; holidays and storms having reduced stocks in consumers' hands, and there is thus a keen demand for prompt supplies. Best Durham gas coals are from about 25s. 6d. to 26s. per ton f.o.b.; second-class qualities vary from about 17s. to 19s. 6d.; and for "Wear specials," the quotations are from 29s. to 30s., but with some variation, the home and allied demand being full, and leaving the surplus in good request. A large consumption of coking coal beneficially influences the Durham gas coal trade. New contracts for gas coal are now slowly being looked for; but the settlement is hampered by the new regulations as to the possible duration of these contracts. Freight on gas coal is high—21s. having been paid, Tyne to London, which is sevenfold the rate of three years ago; but there is, of course, much coal being carried on long freight contracts. In the coke market, gas coke has its output well taken up. The price varies from 31s. to 32s 6d. per ton f.o.b., according to the place of shipment. Export coke finds steamers scarce, though up to 45s. 6d. has been paid from the Tyne to Dunkirk and other northern French ports.

The Birstall District Council have advanced the salary of Mr. Rufus Ellis, the Gas Manager, to the maximum of £150 per annum, in lieu of war bonus. All Council workmen have had their war bonus increased to 5s. per week.

At a meeting of the Newton-in-Makerfield Gas Committee, the Clerk read the letter which he had written to the Local Government Board, inquiring if they were prepared to receive an application for the provisions of the Public Authorities and Bodies (Loans) Act, 1916, to be applied to the Council, and to sanction the balance of £10,648 of the total loan (£14,468) for which application was made to the Board in May, 1915. The Board replied that they were not prepared to entertain an application for sanction to a loan for the purpose in question under the Act named, nor were they willing to sanction a loan under the Provisional Order of 1915 until the consent of the Treasury had first been obtained.

Factory Canteen Equipment

Gas Undertakings receiving special inquiries for the above are invited to communicate with The Davis Gas Stove Co., Ltd., concerning them.

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Devon Gas Association.

The Eleventh Annual Meeting of the Association was held at Exeter last Wednesday. The Chairman (Mr. F. T. Depree), in moving the adoption of the report, alluded to the exceptionally trying circumstances of the past year. Further increases in the cost of raw materials—particularly coal—had reduced the profit; and the Directors had therefore recommended a payment of 2½ p.ct. dividend. There had been an improved market for residuals, which had been a material help; and there was every indication that this would be maintained. The time had now come when they were compelled to ask the gas consumers to join the shareholders in meeting the circumstances; and it had been decided to raise the price of gas 4d. per 1000 c.ft. at all the works. Compared with small individual gas companies—several of which had already ceased trading—the Association were in a strong position; and he felt convinced that, with a return to anything like moderate times and prices for coal, &c., they would be able comfortably to revert to the usual dividend, and possibly do a little better. Mr. R. J. Rew (who seconded) considered the dividend of 2½ p.ct. was satisfactory, in the circumstances. The Association had had an uphill fight against unforeseen difficulties; but the additional cost of manufacture had been largely overcome by economy and improved methods of production, and the price of gas maintained at a steady and (considering the size of the works) reasonable figure. The gas made in 1916 decreased 9 p.ct.; but he was glad to say that the first three months of the present year showed an increase, which he had every confidence would be maintained. Mr. W. Cash agreed that, though they were passing through an extremely difficult period, the affairs of the Association had been carefully looked after. The report was adopted.

Maryborough (Queensland) Gas Company.—The report for the last half of the year 1916, which was presented at the meeting of the Company in February, stated that the profits, after making provision for bad and doubtful debts, repairs and renewals, depreciation, working expenses, wear and tear, and other charges, and including the balance brought forward, amounted to £1056, from which the Directors recommended the payment of the usual dividend of 6 p.ct. per annum, free of income-tax. The net proceeds of the sales of gas, residual products, fittings, &c., were £4752. At the close of the ordinary meeting, an extraordinary general meeting was held, for the purpose of passing a resolution adding to the Articles of Association one to the effect that the "Company in general meeting may pass a resolution that it is desirable to capitalize any sum being part of the undivided profits of the Company for the time being standing to the credit of the Company's reserve funds, and accordingly that this sum be distributed as a bonus, free from income-tax, among the holders of the shares in proportion, as near as may be, to the shares held by them respectively; and that the Directors be authorized to distribute among them the relative numbers of the unissued shares corresponding with the sum so distributed as a bonus, in like proportion."

Wrexham Gas Company.

A dividend at the rate of 5 p.ct. per annum was declared at the annual meeting of the Wrexham Gas Company. The Chairman (Mr. J. Oswell Bury) congratulated the stockholders upon the satisfactory report and accounts which were presented for approval. They had, he said, been working under great difficulties; but notwithstanding all the adverse circumstances, they had, by the exercise of rigid economy in every department, earned the full statutory dividend, with a small surplus. One factor which had enabled them to do this was the further increase of 3d. per 1000 c.ft. in the price of gas, which was made from the end of the March quarter. With this increase, the charge for lighting purposes through ordinary meters was 2s. 9d. per 1000 c.ft.—the lowest price in the whole of Wales. The revenue account showed the total receipts from all sources for the past year to have been £27,790, as compared with £26,737 in 1915. There was an excellent demand for coke throughout the year; and the price was increased to 20s. per ton for ordinary, and 21s. 8d. for broken coke and breeze. But notwithstanding this increase, coke sales realized £102 less than in 1915, owing to less coal having been carbonized. Coal cost £514 more, in spite of the fact that about 1100 tons less were carbonized. Then there was one other decrease, which the Directors would gladly have seen reversed—the reduction of £76 in the bonus payable to the employees under the co-partnership scheme, in consequence of the increase in the price of gas. The increased receipts for the year, added to the decreased expenditure, resulted in a net increased revenue of £1197. As to the future of the Company, he could only predict prosperity. The extension of the high-pressure mains in the thickly populated parishes of the district was in course of being carried out just before the war commenced; and owing to the shortage of labour and material, it had been impossible to instal the services for prepayment meters, for which there were several hundreds of customers waiting. When this work was carried out, a substantial increase in sales of gas might be confidently anticipated. There was at present under consideration the question of installing an oil-washing plant. Of the employees, 28 had joined the army. He wished to acknowledge the excellent services of Mr. William Heyward (the Secretary), Mr. Owen Evans (the Engineer and Manager), and their respective staffs.

C. H. Kempton & Co., Ltd.—A joint-stock company has been registered with the title of C. H. Kempton & Co., Ltd., gas-mantle manufacturers. The capital is £10,000 in £1 shares; 2000 of them being preference shares. Offices: Stangate House, No. 235, Westminster Bridge Road, S.E.

Water-Slide Chandeliers.—Some damage was caused to a house at Haverhill by an explosion which resulted on the striking of a match in a room where there was a leaking water-slide pendant. The reason assigned for the accumulation of gas in the room was the familiar one, that "the water had evaporated." By great good fortune, the striker of the match escaped with nothing more than a singeing.

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Gas-Works Extensions at Wombwell.

A Local Government Board inquiry is fixed to be held to-morrow at Wombwell, dealing with projected extensions at the Urban District Council Gas-Works. In March, 1915, there was an inquiry with reference to a Provisional Order to extend the limits of gas supply so as to include the parishes of Great Houghton and Little Houghton. The Provisional Order was granted; and a further inquiry was fixed with reference to the Council's application for sanction to a loan for the cost of extending the mains into the new district, and also for the installation of vertical retorts. But, owing to the Treasury withholding its sanction to new capital being raised, this inquiry was never held. The Council have now, however, received an intimation from the Local Government Board that they are prepared to go forward with the application, and approve the schemes; so that everything may be in order for a start being made on the work when the Treasury remove their restrictions on the borrowing of money. The Great Houghton and Little Houghton schemes consist of compressing plant, high-pressure mains, &c. The vertical retort installation is to have a capacity of 650,000 c.ft. per day; the entire cost of the two schemes, on a pre-war basis, being about £17,000.

Cost of Coal in the United States.—Writing to "Gas Age," Mr. W. S. Barstow remarks that, apart from a natural upward tendency, previous to the European War, the price of coal was fairly uniform from year to year; but there was now a condition without parallel, which was likely to be maintained for an indefinite time, as nothing short of a serious industrial panic would restore coal to the former price-level. Up to June, 1916, it could be bought by public companies for 70 c. to 90 c. per ton at the mine. But the average price on current yearly contracts was now $1·55, and no contract for future delivery could be placed under $2·50; while companies buying in the open market—as many were compelled to do on account of short deliveries—had to pay $4·25 to $5.

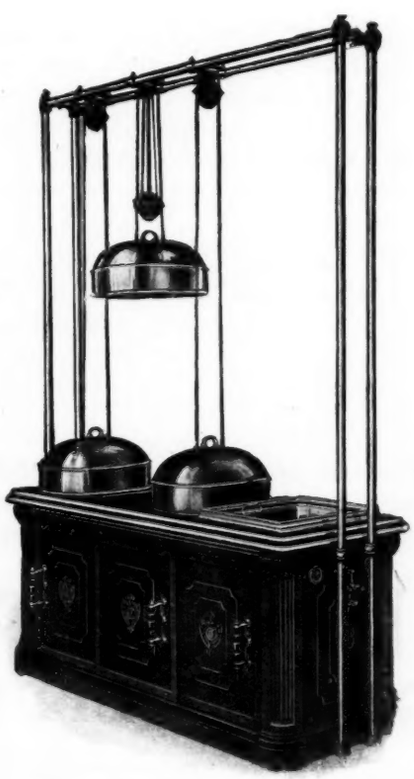
Wellington (N.Z.) Gas Company.—There was a substantial increase in the quantity of gas sold by the Company during 1916; and consequently, the annual report stated, the Directors were, in spite of the heavy additional cost of labour and materials, in a position to recommend the declaration of a dividend at the rate of 10 p.ct. per annum. Owing to the impossibility of obtaining pipes, except at prohibitive prices, mainlaying work has been restricted as much as possible; but 524 services were laid during the year. The profit and loss account, after the payment of the preference dividend and the interim dividend on the ordinary shares, and the provision of £3000 towards depreciation of plant, showed a balance of £32,149; and the payment of the final dividend leaves £20,360 to be carried forward, as compared with £21,814 at the end of the previous year. The sale of gas, residuals, fittings, &c., realized £113,475; while manufacturing, distribution, management, and other charges totalled £84,627.

Wages Arbitration at Macclesfield.—At the last meeting of the Macclesfield Town Council, the Clerk read a communication from the Industrial Commissioner's Department, stating that Mr. A. Willis had been appointed to act as Arbitrator in connection with the difference which had arisen respecting the application for an advance in wages made by the National Union of General Workers, on behalf of their members in the employ of the Corporation.

Gas Company's Foreman to Join-up.—The Torpoint Military Tribunal decided at their last sitting that F. Thomas, foreman of the local gas-works, should join-up when a suitable substitute is found. Mr. Underwood (Secretary to the Company) urged that Thomas was indispensable. He understood the work; and, among other things, the Company had a contract with the Government for tar. The Military Representative said that only public necessity would demand a man's retention in civil occupation. The Chairman (Mr. Rose) remarked that this seemed a case of public necessity; but Thomas must go if a substitute were found who could carry on.

Colchester Gas "Bill."—When the Special (Gas Company's) Bill Committee presented to the Colchester Town Council the taxed bill of costs of the opposition to the Bill promoted by the Gas Company last year, the Deputy-Mayor mentioned that with witness's fees, &c., the total cost to the Council amounted to £1051 6s. 10½d.; and though the Corporation did not succeed in acquiring the undertaking, yet valuable concessions were obtained. Mr. Wallace said this was the final chapter in a storm which did not end as many hoped it would. But though the opposition had cost more than they were led to suppose, they would not have secured the concessions without opposition—especially the one relating to the standard price. The Act as it stood was much more favourable to consumers than it would have been without the opposition. The Gas Company's costs, it is stated, amounted to £3616.

Londonderry Gas Company.—The Chairman of the Londonderry Gas Company (Mr. H. J. Cooke), moving, at the annual meeting, the adoption of the report—recommending a dividend of 7½ p.ct. on the old and 5½ p.ct. on the new shares, free of income-tax—said the past year had all the difficulties of 1915, with some new ones. Their energies and resources had been severely tasked to keep the works in operation, through the difficulty of getting all the needful raw materials, and an adequate supply of efficient labour. Out of a staff of about 100, nearly half had joined the army. Coal had risen from the pre-war figure of 13s. to 23s. per ton; while the cost of labour had increased on an average about 45 p.ct. If the charge for the latter item was to be kept within reasonable bounds, the adoption of labour-saving appliances would have to be seriously considered. The higher prices at which gas had now to be sold checked the consumption, which showed a considerable falling-off for the year. On the revenue side, the profits on residuals had been fairly satisfactory. Sulphate of ammonia, however, showed a heavy falling off, due to the Government regulation of price preventing its sale at market value.



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By Appointment.

Gas Fatality in Dundee.—Mrs. Robertson (the wife of a Dundee police constable) and her ten-year-old daughter were found lying dead in front of a gas-cooker, the tap of which was turned on, and the place full of gas. The window was closed, and a towel had been placed at the bottom of the door, to prevent the escape of the gas.

Spitzbergen Coal Developments.—The Swedish Spitzbergen Coal Mining Company, who have undertaken an investigation into the coal-fields of Spitzbergen, are making energetic preparations to start preliminary work this summer. It is hoped to begin with a yearly output of 60,000 tons of coal, to be increased to 200,000 tons as soon as possible.

New Zealand and Foreign Gas-Mantles.—There has been published an Order in Council of the Dominion of New Zealand, dated Dec. 18, which prohibits the importation into the Dominion, save with the consent of the Minister of Customs, of gas-mantles manufactured in, or exported from, any place other than the United Kingdom or a British Possession.

Notts. Agriculturists and Sulphate of Ammonia.—Though many of the leading agriculturists in Nottinghamshire have not been slow to recognize the value of the liberal use of sulphate of ammonia, recommendations in regard to the matter have fallen in a number of cases upon deaf ears. Mr. T. W. Warner (Agent to the Duke of Portland, the Lord Lieutenant and the largest landowner in the county) served, therefore, a useful purpose, when presiding at a meeting of the County War Agricultural Committee on Thursday, in strongly urging that farmers should utilize sulphate and other stimulants for their corn.

Appeal by Gas Stokers.—At the Scarborough tribunal, last week, four gas stokers employed by the Scarborough Gas Company appealed. It was said that these men had been debadged, and therefore became liable to military service, in consequence of the installation of certain plant at the works. Two men who were passed for general service had their appeals dismissed, with grace to May 11. The case of a man passed for general service, but who submitted a medical certificate, was adjourned to the Central Medical Board. The fourth man, aged 24, married, passed C1, had his application disallowed; but, for domestic reasons, he was given grace to June 13.

Appeal for Economy at Ossett.—At the Ossett Town Council meeting last week, Alderman Robinson, the Chairman of the Gas Committee, said in normal times he had been accustomed to appeal to the public to use gas liberally, but now he must appeal for the greatest economy, or there might have to be distasteful compulsory restrictions. Owing to the decreased coal output and transport difficulties, the stock of coal at the gas-works had been reduced from 3000 to 150 tons, and he had some fear that it could not be replenished during the coming summer. Mr. T. J. Peace said very little gas was now used for street lighting, and the domestic consumption was not great.

Prospective Demand for Gas Appliances.—A prospective demand for gas appliances was feortold at a conference held in Manchester recently of the National Housing and Town Planning Council, when delegates were present representing trade unions, trade councils, and co-operative societies in Lancashire and North Cheshire. The Chairman (Mr. Harold Shawcross, of Rochdale) quoted statistics to show that during the next ten years 500,000 houses would be required to replace insanitary dwellings; 330,000 to overtake deficient building within the last seven years; and 800,000 to provide for the increase of working-class population. These made a total of 1,630,000 houses; and if the cost was an average of £260 each, about £40,000,000 a year would be required for the next ten years.

A Gas-Works Fatality.—At a Coroner's inquiry into the circumstances attending the death of Wm. Hughes, at the Banbridge Gas-Works, James Marron, assistant stoker at the works, said that on the night of April 6 he was on duty with deceased. At midnight Hughes went to the top of the plant to lower a skip to refill with coal. Deceased was in charge of the engine, which was running at the time. As there was some delay, witness shouted to Hughes to know if he was "all right." Getting no response on a second call, he shut-off the engine, and went to the top of the plant, where he found the man on the ladder held tight by his clothing against the shafting. Assistance was called, but it was of no avail. A verdict of "Death by dislocation of the neck, caused by being caught in the shafting," was returned; the Jury declaring that the light at the place where the accident occurred was insufficient.

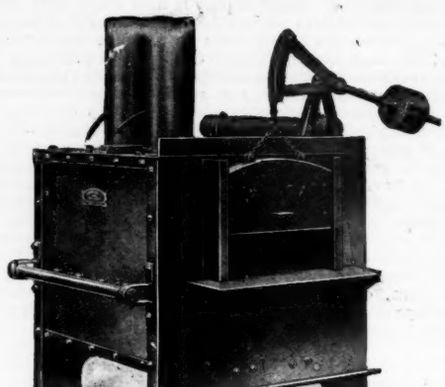
The "Board of Trade Journal" announces that a firm in Durban desire to get into touch with United Kingdom manufacturers of tar, so that they may prepare now to represent manufacturers after the war. Manufacturers desirous of appointing an agent at Durban may obtain the name and address of the firm on application to the Department of Commercial Intelligence, No. 73, Basinghall Street, London, E.C. 2. In making application, the reference number [138] should be quoted. A Rome agent wishes to represent, on commission, United Kingdom manufacturers of gas-cookers, bath-geysers, gas-stoves, &c. Manufacturers and exporters desirous of appointing agents in Italy in preparation for *post-bellum* trade, should address the Secretary, British Chamber of Commerce for Italy, No. 7, Via Carlo Felice, Genoa, quoting the reference number [1260].

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "Journal" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.



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FOR RELIABILITY

The Richmond Gas Stove & Meter Co., Ltd.,
WARRINGTON & LONDON.

Gas Company's Generosity Abused.—At Kingstown Police Court, Mr. Swifte, K.C., in sentencing John Carroll to a month's imprisonment for the larceny of a quantity of lead and a stop-cock, the property of the Alliance and Dublin Gas Consumers' Company, remarked that he had previously been convicted of a similar offence. When he came out of gaol, the Gas Company had pity upon him, and took him back into their employ. He had treated the Company very badly indeed. The lead and stop-cock were valued at 15s.

Singular Fire at the Rochdale Gas-Works.—A fire, which fortunately was confined to a small area and only caused damage to the amount of about £20, occurred on Thursday afternoon at the Rochdale Corporation Gas-Works. Owing to a plug blowing out from the top of the still, the vapour, on escaping, was driven by steam into another room, and in this was a bunsen burner which is constantly lighted. The vapour immediately caught fire, and the flames quickly travelled back into the still-room, which was soon enveloped in flames. Several tanks containing benzol and naphtha were in danger; but the Rochdale Fire Brigade subdued the fire, and eventually extinguished it. On the top of the building containing the stills and tank is a large water-tank. Owing to the heat from the fire the tank burst, and the water flowed rapidly through the still-room and on to the end of a steam-boiler.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for April 12.]

Nos. 4710—4968.

DREFFEIN, H. A.—"Gas producing and consuming plants." No. 4873.

FLINN, M. S.—See Dreffein. No. 4873.

STABLES, E. C.—"Condensers or coolers for gases." No. 4893.

STOTHARD, H.—"Grates for gas producers." No. 4833.

TIBERTI, G. O.—"Rotary gas-engines." No. 4768.

Stafford Gas and Electricity Committee.—It has been decided by the Stafford Town Council that the control of the accounts of the Gas and Electricity Departments shall be placed in the hands of the Borough Treasurer. The Chairman of the Committee opposed the proposal, on the ground, among other things, that it would introduce dual management. Another suggestion, that the Committee who now manage the two departments should be divided, and that each should be under a separate Committee, was not adopted.

STOCK MARKET REPORT.

THE Stock Exchange reopened its doors on Tuesday morning for the resumption of business after the Easter interval, and at once gave evidence of being inspired with cheerfulness. This tone emanated from two leading factors. First, General Haig's despatches from the western front, which were all that could be desired and more than could fairly have been expected; and, second, the favourable development of affairs in the United States, with its assurance of financial, and perhaps material, aid to the European Entente Powers. Thus actuated, there was a general demand for everything of good repute; and prices advanced freely. The volume of money seeking investment was on the increase; but, upon the other hand, it was still confronted with the shortage of stock, which denied it scope for activity. The result was that markets, howsoever strong, were not busy. But other openings for capital were forthcoming in Treasury Bills, Exchequer Bonds, and the Australian Loan.

The gilt-edged market was in great form, and Government issues showed large advances. The War Loan soared up to 95½, and Consols and Indians and Colonials were in request. Home Rails were very firm, especially the prior charges. Americans hung fire at first, but shared at last in the contagious buoyancy, Argentines improved, and South Africans were fairly firm. There were several strong points in the Foreign Market, notably Japanese, Chinese, and Brazilian. A slight reaction in French from the free advance resulting from the improved value of the franc set in; but a recovery was effected. Among the rest, Rubber and Oil concerns were prominently firm, and Shipping showed improvement.

Business in the Gas Market was of the quietest; the sum total of transactions being about enough to constitute the reasonable work of a couple of days. This state of things, however, was far from engendering any weakness; the tendency being all in the other direction. The most conspicuous instances of advanced quotations were a rise of 3 in Gas Light ordinary and 1 in the maximum, and of 4 in Imperial Continental, which opened at 66½ and closed at 73. Other issues changed hands at higher figures; but the quotations were left standing. In the Money Market, the situation was quite easy. Discount was quiet and unchanged. The German mark and the Austrian kroner have had a further fall since a week ago.

Bargains done for cash during the week were as follows: On Tuesday, Brentford debenture 68, Imperial Continental 66½, Malta and Mediterranean 3⅜, South Metropolitan, 75½, 76½. On Wednesday, Brentford "A" 83, 83½, Commercial 4 p.ct. 72¼, Gas Light maximum 55⅜, 56, Imperial Continental 66½, 67, Malta and Mediterranean 4, South Metropolitan 76, 76½. On Thursday, Commercial 4 p.ct. 73, 73½, Gas Light ordinary 67½ 68⅛, 68⅞, 69¼, 69½, 70, Imperial Continental 66, 67, 67¼, South Metropolitan 76. On Friday, Bombay 5, European 10½, Gas Light ordinary 70, 70⅛, Imperial Continental 69½, 71, ditto debenture 60, Oriental 107½, Primitiva preference 60s., South Metropolitan 76¾, Southend debenture 65. On Saturday, Bombay 4 13/16, Gas Light ordinary 70¼, 70½, 70¾, 71, Imperial Continental 70, 71, 73.

The Bank rate is 5 p.ct., as fixed on the 5th inst.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex. Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	53—63	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	60—62*	..
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4½—5½	4 13/16—5
50,000	10	Feb. 26	16	15/-		2⅜—30	24—26	24 5/16—2 ½
383,110	10	"	7	7/-	Bournemouth Gas and Water { 10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	15—15½	10¾—11¼	..
115,000	10	"	6	6/-		13½—14	9¼—9¾	..
159,740	—	"	—	4%		..	71—73	..
992,045	Stk.	Feb. 26	14	55/-	Brentford A Consolid.	261—266	83—85	82—83½
734,920	"	"	11	53/9	Do. B New	204—209	80—83	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	83—83	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	67—69	68
217,380	"	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	157—162	..
244,200	"	"	8	7%	Do. A Ord. Stk.	154—159	112—117	..
530 000	20	Mar. 26	12½	22/6	British	44—45	32½—33½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	"	"	4	4%	Buenos Ayres 4 p.c. Deb.	85—87	57—60	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	1¼—1¾	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	"	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	72½—73½
560 000	"	"	5½	46/8	Do. 3½ p.c. do.	103—105	65—68	..
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	37—39	37
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	58—60	..
278,400	—	—	—	11⅛%	Croydon B and C 7 p.c.,	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅜%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17⅛—18	10—11	10⅛
16,313 430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds	98—102	70—72	67⅛—71
2,600,000	"	"	3½	3½%		76—79	55—57	55⅛—56
4,062,235	"	"	4	4%		95—99	70—72	..
4,674 850	"	June 11	3	3%		72½—74½	54—56	..
130,030	"	"	10	10%		..	..	..
2'8,740	"	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87—89	76—81	..
70.00	10	April 29	11	6%	Hongkong & China, Ltd.	16¼—16½	8—9	..
26,600	—	—	—	9½%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7½	7⅛%	Ilford A and C.	151—154	102—107	..
65,780	"	"	6⅞	5⅞%	Do. B	115—118	80—85	..
65,503	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	71—74	..
4,910,000	"	May 14	9	4½%	Imperial Continental	150—160	70—73	66½—73
1,235,000	"	Feb. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	62—63	60
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	81—83	..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3¾—4⅛	3⅞—4
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98*	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gateh'dCon.	98½—99½	71¼—72½	..
529,705	"	June 26	3⅜	3⅜%	Do. 3½ p.c. Deb.	82—83	73—75	..
55,940	10	Feb. 26	7/14/0	7⅛%	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	106—108	107½
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	92—97	..
100,000	50	"	12	11%	Do. C	118—121	85—90	..
52,000	50	"	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅞—2⅛	..
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅞—5	55/—65/-	60/-
621,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	61—67	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. / 5 p.c. Deb.	10½—11	7⅜—8⅛	..
125,000	50	July 1	5	5%		47—49	42—44	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	180—190	..
209,984	"	"	10	10%	Do. B	222—224	180—190	..
523 500	"	"	10	10%	Do. C	220—222	170—180	..
90,000	10	May 28	9	6/-	South African	10½—11½	..	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	75—77	75½—76¾
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	54—56	..
224,820	"	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	"	"	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	7 —78	..
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135,000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—90	..
647,740	"	May 14	5	5%	Southampton Ord.	99—102	77—79	..
120,000	"	Feb. 12	7½	7½%	Tottenham District { A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	95—100	..
782,275	"	"	6	5⅝%		115—117	68—73	..
181.255	"	June 26	4	4%		87—89	65—67	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
30,000	"	Feb. 26	8⅜	80/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	114—119	..
255,636	"	"	6½	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	"	"	5/17/3	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	"	"	6½	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	"	"	6⅝	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	51—54	..

* Ex. div.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

CHIEF GAS ENGINEER AND MANAGER. Stoke-on-Trent Corporation. Applications by April 26.
WORKING MANAGER. No. 6298.
WORKING FOREMAN. No. 6301.
GAS STOKER. No. 6302.
GAS FITTER. Formby Gas-Works.

Shares for Sale.

ERNST HILDEBRANDT, LTD London Mart April 27.

Meeting.

IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel. May 1. 2.30 o'clock.

Plant, &c. (Second Hand), for Sale.

METERS. No. 6294.
SULPHURIC ACID PLANT. Carlisle Gas Department. Tenders by April 27.

Plant, &c. (Second Hand) Wanted.

KRAMERS AND AARTS WATER GAS PLANT. No. 6300.

TENDERS FOR Coal.

BLACKPOOL GAS WORKS.
CARLISLE GAS DEPARTMENT. Tenders by April 25.
SPALDING GAS DEPARTMENT. Tenders by April 28.
STRATFORD-ON-AVON GAS DEPARTMENT. Tenders by April 24.
WOLVERHAMPTON GAS COMPANY. Tenders by May 6

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Resists 4,500° Fahr. Best for Gas-Works.
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BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Feb. 13, p. 278.

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FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.
C. & W. WALKER, LIMITED,
DONNINGTON, NEWPORT, SALOP.

TAR AND GAS LIQUOR WANTED IN LONDON DISTRICT.

THOMAS CLAYTON (Oldbury) Ltd.,
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JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

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BALE & CHURCH, LTD.
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"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.

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Phone: Avenue 6680.

PRACTICAL Working Manager Wanted for Small Gas-Works in Midlands.
For particulars, apply No. 6298, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Gas Stoker (Ineligible) Capable of Taking Complete Control of small Gas-Works in Notts.
Apply, by letter, stating Age, Experience, and Wages required, to No. 6302, care of Mr. KING, 11, Bolt Court FLEET STREET, E.C. 4.

WANTED for a Gas-Works near London making 150 Millions, a Good GENERAL WORKING FOREMAN. Good knowledge of Regenerators, Carburetted Water Gas, and Sulphate Plants Essential. Used to Engines and Ordinary Machinery. Capable of Handling men. State Weekly Wage required. House on Works with Coals and Gas free.
Apply, by letter, with *copies* of Testimonials, to No. 6301, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

COUNTY BOROUGH OF STOKE-ON-TRENT.

APPOINTMENT OF CHIEF GAS ENGINEER AND MANAGER.

THE Corporation of Stoke-on-Trent invite Applications for the Position of CHIEF GAS ENGINEER and MANAGER of their Gas Undertakings, which comprise Four Works situate at Burslem, Stoke, Fenton, and Longton.
The Salary will be £500, rising to £700 per Annum.
The person appointed will be required to Reside in the Borough, and to Devote the Whole of his Time to the Duties of the Office, and will not be allowed to engage in private practice.
Canvassing, either directly or indirectly, will be regarded as a Disqualification.
Applications, stating Age, Qualifications, and Experience, accompanied by *copies* of not more than Three recent Testimonials, and endorsed "Gas Engineer," should be sent to the undersigned not later than 10 a.m. on Thursday, the 26th of April, 1917.
E. B. SHARPLEY,
Town Hall, Stoke-on-Trent. Town Clerk.
April 4, 1917.

WANTED — Steel Tanks (New or Stock or Second-Hand) of 70,000 to 100,000 gallons capacity.
Full Particulars and Lowest Prices to No. 6297, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—a Second-Hand Kramers and Aarts BLUE WATER-GAS PLANT, Equal to make 500,000 c.ft. per twenty-four hours.
Particulars and Price to No. 6300, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.